



IDENTIFYING PROGRAMS TO REDUCE ROAD TRAUMA TO ACT MOTORCYCLISTS

Prepared by

Kristi Greig, Narelle Haworth and Darren Wishart

DECEMBER 2007



*The Centre for Accident Research & Road Safety - Queensland is
a joint venture initiative of the Motor Accident Insurance
Commission and Queensland University of Technology*



Preface

Project Manager / Team Leader:

Narelle Haworth

Research Team:

- Kristi Greig
- Darren Wishart
- Barry Watson

Acknowledgements

The authors would like to acknowledge the funding provided by the ACT-NRMA Road Safety Trust and the assistance of the many motorcycling organisations and road safety stakeholders throughout Australia and New Zealand who provided valuable information as part of this project.

Contents

EXECUTIVE SUMMARY	VII
1. INTRODUCTION	1
1.1 BACKGROUND	1
1.2 PROJECT OBJECTIVES.....	1
1.3 STRUCTURE OF THE REPORT	2
2. METHODOLOGY	3
2.1 METHODS USED TO IDENTIFY THE INVOLVEMENT OF MOTORCYCLISTS IN CRASHES IN AUSTRALIA AND NEW ZEALAND.....	3
2.2 METHODS USED TO IDENTIFY MOTORCYCLE SAFETY RELATED ACTIVITIES IMPLEMENTED IN AUSTRALIA AND NEW ZEALAND.....	3
2.2.1 Identification of key components in motorcycle safety activities with potential to reduce road trauma to motorcyclists.....	4
2.3 METHODS USED FOR THE DEVELOPMENT OF RECOMMENDATIONS FOR SUITABLE MOTORCYCLE SAFETY PROGRAMS FOR ACT MOTORCYCLISTS	5
3. IDENTIFICATION OF THE EXTENT AND PATTERNS OF MOTORCYCLE CRASHES IN AUSTRALIA AND NEW ZEALAND	7
3.1 AUSTRALIA WIDE CRASH DATA	7
3.1.1 Comparisons of fatalities among jurisdictions	7
3.1.2 National data for non-fatal injuries	9
3.2 MOTORCYCLE CRASH DATA IN INDIVIDUAL JURISDICTIONS IN AUSTRALIAN AND NEW ZEALAND	10
3.2.1 ACT data.....	10
3.2.2 New South Wales.....	11
3.2.3 Victorian data.....	15
3.2.4 Queensland data	16
3.2.5 New Zealand data.....	18
3.3 THE RELIABILITY OF MOTORCYCLE CRASH DATA.....	19
4. MOTORCYCLE SAFETY SYSTEMS AND PROGRAMS IN AUSTRALIA AND NEW ZEALAND.....	21
4.1 MECHANISMS FOR IMPROVING MOTORCYCLE SAFETY	21
4.2 INEXPERIENCE OR LACK OF RECENT EXPERIENCE	22
4.2.1 Licensing	22
4.2.2 Training	22
4.2.3 Ride guides	27
4.3 RISK TAKING	28
4.3.1 Educational initiatives to reduce drink riding	29
4.3.2 Enforcement programs	30
4.3.3 Riders not wearing a helmet	31
4.4 DRIVER FAILURE TO SEE MOTORCYCLES.....	31
4.4.1 Advertisements addressing drivers' failure to see motorcyclists	32
4.4.2 Motorcycle awareness campaigns	33
4.4.3 Motorcyclists looking out for themselves.....	35
4.4.4 Motorcycle design, colour, and colour of protective clothing	36

4.5	INSTABILITY AND BRAKING DIFFICULTIES.....	37
4.6	ROAD SURFACE AND ENVIRONMENTAL HAZARDS	37
4.6.1	The design of, and improvements to, roads and road furniture.....	38
4.6.2	Treatments on popular motorcycle routes	39
4.6.3	Road hazard reporting	40
4.6.4	Auditing.....	40
4.6.5	Blackspot programs.....	40
4.6.6	Intersection improvements.....	41
4.6.7	Educating riders about dangerous road environments.....	41
4.7	VULNERABILITY TO INJURY.....	41
4.7.1	Helmets.....	42
4.7.2	Protective clothing	42
5.	DISCUSSION AND RECOMMENDATIONS FOR SUITABLE SAFETY PROGRAMS FOR ACT MOTORCYCLISTS.....	45
5.1	LIMITATIONS OF EXISTING PROGRAMS	45
5.2	POTENTIAL APPROACH TO LIMITATIONS	46
5.3	SPECIAL ISSUES FOR POTENTIAL ACT PROGRAMS	47
5.3.1	Riding in NSW.....	47
5.3.2	Difficulties associated with small population	47
5.4	RECOMMENDED PROGRAMS TO REDUCE VULNERABILITY TO INJURY.....	48
5.4.1	Programs for road safety stakeholders	48
5.4.2	Programs for motorcycle clubs and other local organisations	48
5.5	RECOMMENDED PROGRAMS TO COUNTERACT INEXPERIENCE OR LACK OF RECENT EXPERIENCE.....	49
5.5.1	Programs for road safety stakeholders	49
5.5.2	Programs for motorcycle clubs and other local organisations	49
5.6	RECOMMENDED PROGRAMS TO COUNTERACT DRIVER FAILURE TO SEE MOTORCYCLES.....	49
5.7	RECOMMENDED PROGRAMS TO REDUCE INSTABILITY AND BRAKING DIFFICULTIES.....	50
5.8	RECOMMENDED PROGRAMS TO REDUCE ROAD SURFACE AND ENVIRONMENTAL HAZARDS	50
5.8.1	Programs for road safety stakeholders	50
5.8.2	Programs for motorcycle clubs and other local organisations	50
5.9	RECOMMENDED PROGRAMS TO REDUCE RISK TAKING.....	50
5.9.1	Programs for road safety stakeholders	50
5.9.2	Programs for motorcycle clubs and other local organisations	51
	REFERENCES.....	53
	APPENDIX 1: MOTORCYCLE SAFETY PROGRAMS EXAMINED.....	57

Figures

FIGURE 3.1	NUMBERS OF MOTORCYCLIST FATALITIES BY AGE GROUP FROM 1991 TO 2006.	8
FIGURE 3.2	FATALITY RATE PER 100 MILLION VEHICLE KILOMETRES TRAVELLED FOR MOTORCYCLE RIDERS AND OTHER VEHICLE OPERATORS AS A FUNCTION OF AGE (ATSB, 2002).	8
FIGURE 3.3	MOTORCYCLE RIDER AND PILLION CASUALTIES BY TIME OF DAY, QUEENSLAND 2001-2005 (SOURCE WEBCRASH 2, QUEENSLAND TRANSPORT).	17

Tables

TABLE 3.1	MOTORCYCLE RIDER AND PASSENGER DEATHS BY STATE/TERRITORY AND ROAD USER – 1997 TO 2006 (FROM ATSB, 2007).	9
TABLE 3.2	MOTORCYCLE DEATHS PER 10,000 REGISTERED MOTORCYCLES BY STATE/TERRITORY AND ROAD USER – 1997 TO 2006 (FROM ATSB, 2007).	9
TABLE 3.3	ALL CASUALTIES, ROAD USER CLASS, SEX AND AGE IN NSW, 2005. FROM RTA (2007).	11
TABLE 3.4	LICENCE HOLDERS, RIDER CASUALTIES AND CASUALTY RATES PER 1,000 LICENCES IN NSW, 2005. FROM RTA, (2007).	12
TABLE 3.5	MOTOR VEHICLE CONTROLLERS INVOLVED, ROAD USER CLASS, LICENCE STATUS AND DEGREE OF CRASH IN NSW, 2005. FROM RTA (2007).	13
TABLE 3.6	MOTOR VEHICLE CONTROLLER CASUALTIES, BLOOD ALCOHOL CONCENTRATION. FROM RTA (2007)	14
TABLE 3.7	MOTORCYCLE ROAD CAUSALITIES, SAFETY DEVICE USED AND DEGREE OF CASUALTY IN NSW, 2005. FROM RTA (2007).	14
TABLE 3.8	NUMBER OF RIDERS AND PILLIONS INVOLVED IN CRASHES IN VICTORIA 2000 TO 2005 (RCIS AND WEBCRASH).	15
TABLE 3.9	NUMBER OF CRASHES OF EACH SEVERITY LEVEL IN VICTORIA 2000 TO 2005 (RCIS AND WEBCRASH).	15
TABLE 3.10	NUMBER OF RIDERS AND PILLIONS AT EACH INJURY SEVERITY LEVEL IN VICTORIA 2000 TO 2005 (RCIS AND WEBCRASH).	16
TABLE 4.1	SUMMARY OF BEST PRACTICE COMPONENTS FOR MOTORCYCLE LICENSING SYSTEM	23
TABLE 4.2	SUMMARY OF BEST PRACTICE COMPONENTS FOR MOTORCYCLE TRAINING	25

EXECUTIVE SUMMARY

A broad range of motorcycle safety programs and systems exist in Australia and New Zealand. These vary from statewide licensing and training systems run by government licensing and transport agencies to safety programs run in small communities and by individual rider groups. While the effectiveness of licensing and training has been reviewed and recommendations for improvement have been developed (e.g. Haworth & Mulvihill, 2005), little is known about many smaller or innovative programs, and their potential to improve motorcycle safety in the ACT.

To address these issues, the Centre for Accident Research and Road Safety - Queensland (CARRS-Q) has undertaken this research to identify programs to reduce road trauma to ACT motorcyclists. The objectives of the research were to:

- Identify the full extent and patterns of the involvement of motorcycles in fatal, injury and damage only crashes in each state in Australia and New Zealand.
- Identify all motorcycle safety related activities currently and/or previously implemented in Australia and New Zealand (over the last five years), and document what evaluations if any have been carried out.
- Assess which of the programs have potential to reduce motorcyclist road trauma in the ACT.

EXTENT AND PATTERNS OF MOTORCYCLE CRASHES

Crash databases and a range of road safety agency published data were analysed to examine the extent and patterns of motorcycle crashes within Australia and NZ. Overall, male motorcycle riders continue to make up the majority of fatalities, two thirds of fatal crashes occur during the daytime, one third at night, and 54% on weekends. Forty nine percent are single vehicle crashes with half occurring in speed zones less than or equal to 60km/h, a quarter occurring in speed zones 65-95km/h and one quarter in 100km/h and over speed zones (ATSB, 2007).

In recent years, the **trends** in motorcycle fatalities have included an increase in the total number of motorcyclists killed but a decrease in the number of riders aged under 25 killed and an increase in the number of riders aged over 25 killed. Despite the increases in older riders killed and the decrease in younger riders killed, younger riders are strongly **over-represented** in fatalities as a function of the amount of riding that is done by this group.

The number of deaths per 10,000 registered motorcycles Australia-wide has fallen in the last decade, with an average reduction of 3.3% per annum from 2001 to 2006. Amongst the most populous States, Victoria has shown a larger reduction than New South Wales and Queensland has shown an alarming 9% per annum increase. There is a high level of variability in both ACT and NT data.

Motorcyclists comprised 20.5% of all road vehicle traffic crash hospitalisations in 2003-04. The serious injury (hospitalisation) rate for motorcyclists was thirty-four times that for car occupants. The serious injury rate for ACT residents was lower than in other jurisdictions for both motorcycles and cars. A third of residents of the Australian Capital Territory were treated in New South Wales hospitals, this information is not specific to motorcyclists, however.

While fatality data are considered to be reliable, there is some concern that not all eligible motorcycle crashes are reported to Police (or are no less likely to be reported than crashes of other groups), that Police descriptions of what happened in the crash may not always be accurate and that the measures of the amount of motorcycling activity used in denominators of crash and injury rates may be inappropriate.

RANGE OF MOTORCYCLE SAFETY PROGRAMS

Relevant literature was reviewed and contact was made with a wide range of stakeholders to identify motorcycle safety related activities over the past five years. The motorcycle safety programs were categorised in terms of the risk factor that was the main issue addressed (although many programs focussed on more than one risk factor):

- Inexperience or lack of recent experience
- Risk taking
- Driver failure to see motorcyclists
- Instability and braking difficulties
- Road surface and environmental hazards
- Vulnerability to injury

Most programs that address inexperience or lack of recent experience are statewide programs related to licensing and training. Ride guides seek to address inexperience on particular routes.

Similarly, most programs addressing risk taking were also statewide programs. Most programs with this aim were educational programs about avoiding drink-riding and enforcement programs.

Driver failure to see motorcyclists has been addressed in a wide range of public education campaigns aimed at drivers or riders or both. There has been relatively little emphasis on motorcycle design, colour and colour of protective clothing.

There have been few programs addressing instability and braking difficulties.

Road authorities have conducted a wide range of programs that seek to improve the road environment for motorcyclists, ranging from training of road managers to re-modelling intersections. Blackspot treatments in Victoria are among the few motorcycle safety programs of any kind to have been evaluated in terms of crash reductions and are showing encouraging benefits.

Most of the emphasis in reducing vulnerability to injury has been on educational campaigns to encourage riders to wear adequate protective clothing. These programs have generally been large-scale campaigns.

PROGRAMS WITH POTENTIAL TO REDUCE ROAD TRAUMA TO ACT RIDERS

In collecting and examining motorcycle safety programs from across Australia and New Zealand, a range of limitations of existing programs were identified. While there was

some overlap, the limitations of local programs and statewide programs were somewhat different.

In terms of identifying effective programs, the most serious limitation was the lack of evaluation of program effectiveness. While this was unsurprising and understandable for local programs, many large statewide programs had only limited (or no) process evaluation available and very few had an outcome evaluation. Thus, very few programs can be said to be “proven beneficial”, although there are quite a few that are “likely beneficial”.

For these reasons it was recommended that structured guidance material or guidance packages are developed and made available for use by all groups or organisations developing motorcycle safety initiatives.

The special issues in selecting programs that will be potentially of benefit to ACT motorcyclists were considered to be ACT motorcyclists riding in NSW and difficulties associated with a small population. Therefore, at least some of the delivery of road-based safety programs to ACT motorcyclists may need to occur within NSW, possibly as collaborative projects with NSW road safety agencies and neighbouring municipalities. Delivering programs in collaboration with road safety stakeholders in surrounding areas of NSW may also have benefits in increasing the reach of programs, and thus potentially facilitating evaluation. For some programs, the best delivery mechanism may be to influence motorcycle clubs at the national level or to provide links to websites of interstate organisations.

In Chapter 5, the report lists a range of recommended programs, structured according to the risk factors mentioned earlier.

1. INTRODUCTION

1.1 BACKGROUND

Motorcyclists are among the most vulnerable road users, in Australia and internationally. Motorcycle riding is much more likely to result in injury than car travel, and the resulting injuries are likely to be more severe for motorcyclists than for vehicle occupants.

Factors that have been identified as contributing to the over-representation of motorcycles in serious crashes include (from Haworth, Mulvihill & Clark, 2007):

- Vulnerability to injury
- Inexperience or lack of recent experience
- Driver failure to see motorcycles
- Instability and braking difficulties
- Road surface and environmental hazards
- Risk taking.

A broad range of motorcycle safety programs and systems exist in Australia and New Zealand. Rider education and training are the main focus of motorcycle safety for many road safety agencies. Many jurisdictions have some form of pre-licence motorcycle training. Other safety programs include advertising campaigns and public education, as well as smaller programs such as group rides which are usually run in local communities and by individual rider groups. While the effectiveness of licensing and training has been reviewed and recommendations for improvement developed (e.g. Haworth & Mulvihill, 2005), little is known about many of these smaller or innovative programs.

To address these issues, the Centre for Accident Research and Road Safety - Queensland (CARRS-Q) has undertaken this research to identify programs to reduce road trauma to ACT motorcyclists. This research builds on a pilot study that attempted to identify all of the interventions and activities that aim to increase motorcycle safety in Queensland, with a view to developing a comprehensive catalogue that includes an indication of their effectiveness and identifying their potential for implementation in the ACT.

1.2 PROJECT OBJECTIVES

The objectives of the project were to:

- Identify the full extent and patterns of the involvement of motorcycles in fatal, injury and damage only crashes in each state in Australia and New Zealand.
- Identify all motorcycle safety related activities currently and/or previously implemented in Australia and New Zealand (over the last five years), and document what evaluations if any have been carried out.
- Assess which of the programs have potential to reduce motorcyclist road trauma in the ACT.

Throughout this report, the terms initiatives and programs will be used interchangeably to describe motorcycle safety activities.

1.3 STRUCTURE OF THE REPORT

Chapter 2 of this report provides a description of the project methodology. Motorcycle crash involvement, the extent and patterns of fatal, injury and damage only crashes in Australia and New Zealand are examined in Chapters 3. Chapter 4 describes the motorcycle safety programs across Australia and New Zealand over the past five years. Recommendations are made in Chapter 5 regarding programs which have the potential to reduce motorcyclist road trauma in the ACT. The list of programs examined is presented in Appendix 1.

2. METHODOLOGY

The focus of this report is on on-road motorcycle crashes. The methodology undertaken in this project included the following tasks:

- Identified the full extent and patterns involvement of motorcycles in fatal, injury and damage only crashes in each state in Australian and New Zealand.
- Identified all safety related activities currently and/or previously implemented in Australia and New Zealand (over the last five years), and document what evaluations if any have been carried out.
- Assess which of the programs have potential to reduce motorcyclist road trauma in the ACT.

2.1 METHODS USED TO IDENTIFY THE INVOLVEMENT OF MOTORCYCLISTS IN CRASHES IN AUSTRALIA AND NEW ZEALAND

Data collection methods included accessing published data from the Australian Transport Safety Bureau (ATSB), Roads and Traffic Authority NSW (RTA), Traffic Crash Report (ACT), Queensland Transport data and the New Zealand Ministry of Transport. Published data by Berry & Harrison (2007) was used to address serious injuries. An analysis of Road Crash Information System (RCIS) database Victoria, Webcrash in Queensland, and Internet-based crash databases (Crashstats for Victoria) was also undertaken.

2.2 METHODS USED TO IDENTIFY MOTORCYCLE SAFETY RELATED ACTIVITIES IMPLEMENTED IN AUSTRALIA AND NEW ZEALAND

Relevant literature was reviewed to identify all motorcycle safety related activities over the past five years. These activities were identified by searching electronic publications databases, by checking proceedings of recent conferences and by Internet searches (including websites of organisations that may have sponsored recent research) and reviewing motorcycle interest magazines.

Contact was made with a wide range of stakeholders including road safety agencies, Police, motorcycle rider trainers, and motorcycle rider groups to identify programs that have been implemented. Motorcycle clubs were contacted via email. A flyer containing project information was sent to clubs (in all states and territories of Australia (AUS) and clubs in New Zealand) listed in the Australian 'Motorcycle Trader' magazine web version. Although this list did not cover every club across AUS and NZ, the email did included information which encouraged clubs to pass the flyer onto other clubs, groups and individuals involved in motorcycle riding and motorcycle safety.

Contact was made with relevant individuals at the annual Australasian Road Safety, Research Policing and Education conference. Other sources of data on interventions researched included web pages, libraries, local government organisations, and other relevant stakeholders.

2.2.1 Identification of key components in motorcycle safety activities with potential to reduce road trauma to motorcyclists

All activities and interventions were catalogued under the headings below. These components were used to assess the potential of the programs to reduce motorcyclist road trauma in the ACT which is discussed in Chapter 5:

- *Program topic:* The program topics were categorised and defined using the six factors mentioned above (in Chapter 1) that have been identified as contributing to the over-representation of motorcycles in serious crashes.
- *Program organisation:* This refers to any collaboration with other groups or individuals, for example, rider and wider community involvement, collaboration with government and motorcycle safety organisation.
- *Type of delivery (mode/medium of delivery) and how the program is delivered:* The type of deliver is the mode or medium used to deliver the message or intervention. Deliver types include television and radio media, billboard posters, the internet, educational session, rides and awareness days. How the program is delivered is essentially the tools and process used to disseminate the topic information.
- *Likely effectiveness of the program:* Any evaluation of programs will be highlighted, however, often there are few evaluations undertaken. The reach of the program (intended and achieved), that is, how many people the program reached as well as who the target group is, are important facts in the likely effectiveness of the program. Whether the program is based on sound evidence of safety will also be addressed. Operational issues such as the cost (both in time and resources) of implementation also play a role in the effectiveness of a program.

Other supporting information about motorcycle programs was collected and included the following:

- Time of implementation/duration of program
- Participating agencies
- Source/ Contact
- Benefits and issues with the program
- Program relevance to the ACT road environment and ACT motorcyclists.

2.2.1.1 Assessing the potential for programs to improve motorcycle safety

The following key components were used to assess the potential for programs to reduce motorcyclist road trauma.

- Program topic;
- Program organisation;
- Type of delivery (mode/medium of delivery) and how the program is delivered;

- Likely effectiveness of the program.

The program topic is almost always obvious and easily assessed for its relevance to motorcycle safety. However, how a program is delivered is the most difficult component to assess, it is often unknown how many riders the program/activity or initiative affects. Very few programs have been evaluated for their effectiveness. In the absence of a program evaluation, the following criteria are useful in assessing the suitability of programs to improve motorcycle safety.

Likely beneficial: A program is more likely to be successful if any of the following applies:

- the program is based on research;
- risk reduction and/or reduced exposure measures are used;
- the topic addressed reaches the audience for which it was intended;
- the message reaches a large number of riders;
- awareness of motorcycle safety increases;
- a combination of road user, vehicle, and environment-based measures are addressed;
- a combination of crash prevention, reduction in the severity of injury and treatment improvements measures are addressed; and
- although no formal evaluation has been undertaken, anecdotal evidence suggests positive change has occurred or there is potential benefits for the future.

Likely neutral or uncertain: Programs which likely have a neutral effect on safety are those that do not address any of the likely beneficial measures described above, however, also do not have any possibly negative characteristic as described below. For some programs, it is uncertain what safety effect they might have due to a lack of information about that program.

Possibly negative: Those programs which may possibly have a negative effect on safety are those that aim to, or are likely to increase exposure. That is, those programs which knowingly or unknowingly promote or encourage increased riding. As well, programs which produce over-confidence in riders can lead to riskier riding behaviour. These programs might possibly have a negative effect on motorcycle safety.

2.3 METHODS USED FOR THE DEVELOPMENT OF RECOMMENDATIONS FOR SUITABLE MOTORCYCLE SAFETY PROGRAMS FOR ACT MOTORCYCLISTS

In Chapter 5 an assessment of programs is made based on the components outlined above and provides recommendations for the suitability of these programs for ACT motorcyclists. The feasibility of implementation in the ACT is assessed in terms of likely costs, acceptability to riders and regulators and current training and licensing practices.

3. IDENTIFICATION OF THE EXTENT AND PATTERNS OF MOTORCYCLE CRASHES IN AUSTRALIA AND NEW ZEALAND

Section 3 presents Australia-wide motorcycle crash data as well as data from selected jurisdictions in Australia and New Zealand. Australian Capital Territory data is presented as it is directly relevant to motorcycle trauma in the ACT. New South Wales data is presented in some length because it is recognised that ACT riders are likely to ride and crash outside the ACT (Imberger, Styles & Cairney, 2005). In addition, issues of geography and climate are similar in NSW.

3.1 AUSTRALIA WIDE CRASH DATA

In 2006, fatal motorcycle crashes comprised 15% of the national road toll in Australia with 238 riders and pillion killed (ATSB, 2007). However, motorcycles only comprised 3% of all registered motor vehicles (ABS, 2006). When compared on the basis of deaths per kilometres travelled, the risk of fatal injury from a motorcycle crash is 29 times greater than that of other vehicles (ATSB, 2002).

Overall, 95% of motorcyclist fatalities are male, 29% are aged 17-25 and 65% are aged 26 to 59. Two thirds of fatal crashes occur during the daytime, one third at night, and 54% on weekends. Forty nine percent are single vehicle crashes with half occurring in speed zones less than or equal to 60km/h, a quarter occurring in speed zones 65-95km/h and one quarter in 100km/h and over speed zones (ATSB, 2007).

In recent years, the **trends** in motorcycle fatalities have included an increase in the total number of motorcyclists killed from 175 in 1997 to 238 in 2006. Since 1991, there has been a decrease in the number of riders aged under 25 killed and an increase in the number of riders aged over 25 killed (see Figure 3.1). The percentage of riders killed aged over 25 increased from 49% in 1991 to 68% in 2006 (ATSB, 2007).

Despite the increases in older riders killed and the decrease in younger riders killed, younger riders are strongly **over-represented** in fatalities as a function of the amount of riding that is done by this group. Figure 3.2 shows that the fatality rate for 17-25 year old riders (per 100 million vehicle kilometres travelled) was three times that of riders aged 26-39 and about six times that of riders aged 40 and over.

3.1.1 Comparisons of fatalities among jurisdictions

The numbers of motorcyclists killed in each State and Territory from 1997 to 2006 is shown in Table 3.1. New South Wales had the most motorcyclist fatalities each year, with the exception of 2002. The number of fatalities in the ACT has varied from 1 to 8 throughout the period with an average of 2.6 fatalities per year. The number of deaths per 10,000 registered motorcycles is a better measure for comparing the States (although not without problems, see Haworth, 2003). Table 3.2 shows that the motorcyclist fatality rate Australia-wide has fallen in the last decade, with an average reduction of 3.3% per annum from 2001 to 2006. Amongst the most populous States, Victoria has shown a larger reduction than New South Wales and Queensland has shown an alarming 9% per annum increase.

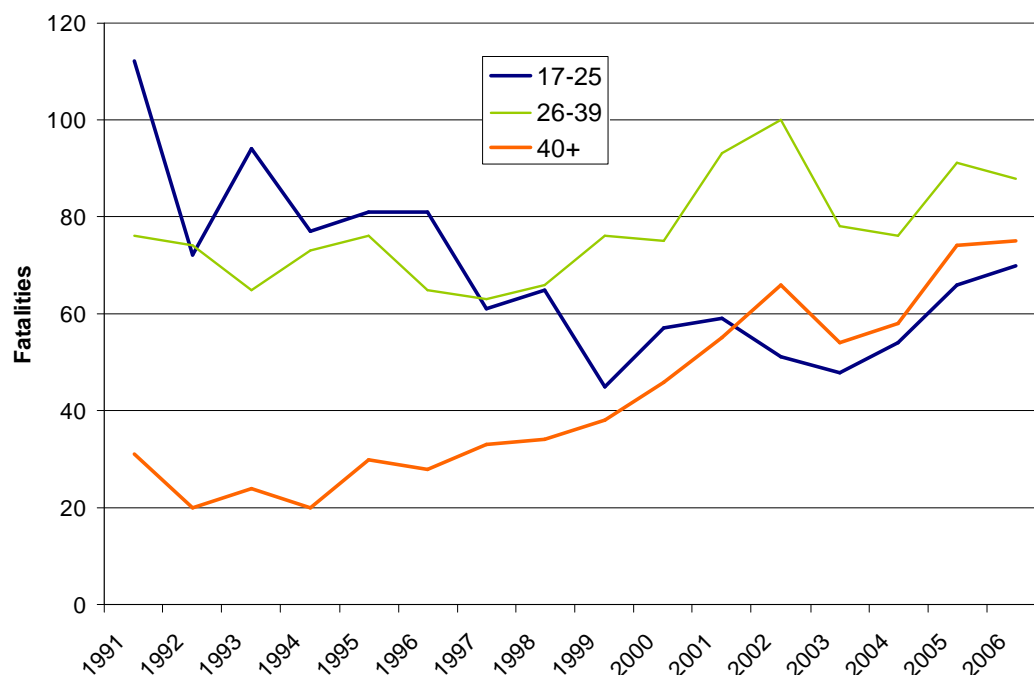


Figure 3.1 Numbers of motorcyclist fatalities by age group from 1991 to 2006.

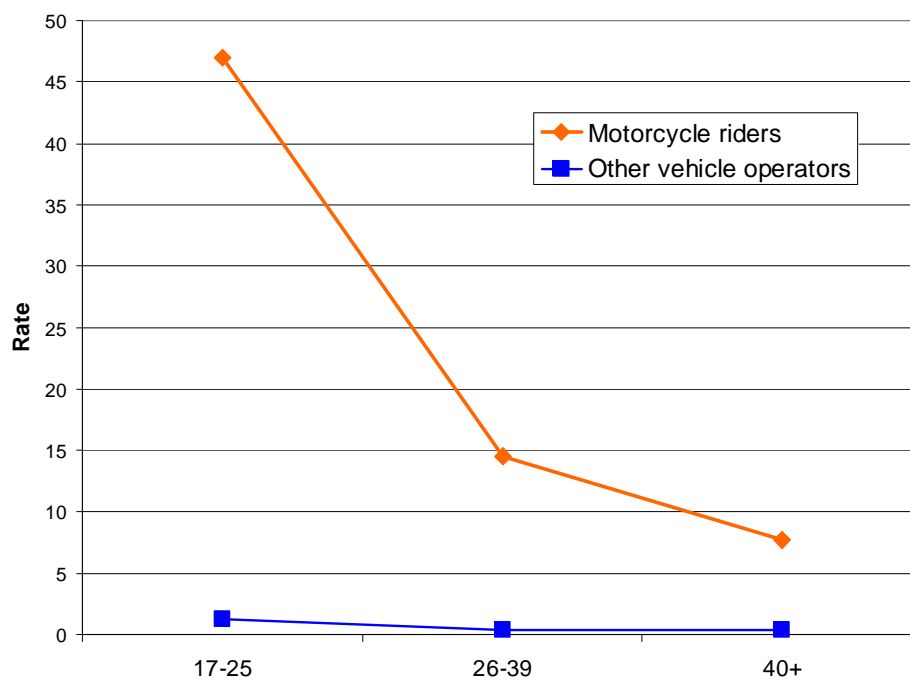


Figure 3.2 Fatality rate per 100 million vehicle kilometres travelled for motorcycle riders and other vehicle operators as a function of age (ATSB, 2002).

Table 3.2 highlights the high level of variability in both ACT and NT data. The percentage change from 2005 to 2005 in the ACT was 65.5% reduction in deaths, the NT saw a 158% increase in deaths. Across 5 years of data, the average rate of change for the ACT was 37.1%. It is therefore unclear whether there is a larger or smaller risk of death due to motorcycling in the ACT compared to other Australian jurisdictions.

Table 3.1 Motorcycle rider and passenger deaths by State/Territory and road user – 1997 to 2006 (from ATSB, 2007).

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
1997	44	41	43	14	19	4	7	5	177
1998	52	48	25	13	28	7	5	3	181
1999	55	38	41	15	19	2	5	1	178
2000	62	46	33	16	23	5	5	1	191
2001	70	64	29	14	28	7	3	1	216
2002	55	56	53	22	23	10	4	1	224
2003	59	39	42	13	23	11	0	1	188
2004	58	37	48	21	23	7	0	2	196
2005	64	48	64	19	22	7	2	8	234
2006	66	46	58	22	32	5	6	3	238

Table 3.2 Motorcycle deaths per 10,000 registered motorcycles by State/Territory and road user – 1997 to 2006 (from ATSB, 2007).

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
<i>Deaths of motorcyclists per 10,000 registered motorcycles ^a</i>									
1997	5.46	5.11	6.45	4.87	4.83	5.28	17.73	8.33	5.65
1998	5.88	5.83	3.56	4.66	6.68	8.52	12.92	5.13	5.50
1999	6.43	4.32	5.60	5.74	4.44	2.33	13.72	1.70	5.27
2000	6.97	4.97	4.46	5.85	5.21	5.90	13.85	1.60	5.53
2001	7.71	6.76	3.90	5.01	6.26	8.31	8.35	1.55	6.16
2002	5.75	5.45	6.74	7.75	4.94	11.35	11.72	1.48	6.04
2003	5.90	3.94	5.01	4.57	4.89	12.82	0.00	1.43	4.98
2004	5.46	3.61	5.38	7.14	4.65	7.78	0.00	2.82	4.95
2005	5.66	4.46	6.57	6.19	4.15	7.40	5.89	10.83	5.55
2006	5.40	4.02	5.25	6.51	5.36	4.77	15.19	3.74	5.14
% change 2005-2006	-4.6	-9.9	-20.1	5.2	29.3	-35.6	157.9	-65.5	-7.3
Ave change 2001-2006 ^b	-5.3	-9.0	4.3	3.2	-3.8	-12.2	-	37.1	-3.3

3.1.2 National data for non-fatal injuries

Road crash fatality data tends to drive road safety policy, but these data may not be representative of the range of severities of outcomes or of the wider range of injuries that may occur. Differences in coding practices among jurisdictions mean that Police-reported non-fatal road crash data is not available at a national level. However, information about hospitalised persons is available from the health system. The information below is taken from the report “Serious injury due to land transport, Australia, 2003-04” (Berry & Harrison, 2007) which provides the most information available on road crash injury hospitalisations.

In 2003-04, there were 5,385 motorcyclists hospitalised as a result of road vehicle traffic crashes across Australia, including 61 residents of the ACT. The number had increased steadily from 4,514 in 1999-00 (Berry & Harrison, 2007, Table 4.17). Motorcyclists comprised 20.5% of all road vehicle traffic crash hospitalisations in 2003-04.

The serious injury (hospitalisation) rate for motorcyclists was thirty-four times that for car occupants (364 motorcyclists compared with 11 car occupants were seriously injured per 100 million vehicle kilometres travelled). The serious injury rates for motorcycles were above the national rate for residents of the Northern Territory, Tasmania, New South

Wales and Victoria. The serious injury rate for ACT residents was lower than in other jurisdictions for both motorcycles and cars.

Berry and Harrison's report provides some relevant information regarding where injured persons from the ACT are treated (and recorded). Table 4.7 of their report shows that most persons who were seriously injured were hospitalised in the same state in which they resided; with the exception of the Northern Territory (85.3%) and the Australian Capital Territory (63.2%). A third of residents of the Australian Capital Territory were treated in New South Wales hospitals, and about 10% of Northern Territory residents were treated at a hospital in a bordering state. This information is not specific to motorcyclists, however.

The pattern of injuries provides a useful input into programs to reduce the vulnerability of motorcyclists. The body region injured in road vehicle traffic crashes differed according to mode of transport (Berry & Harrison, 2007, Table 4.12). Shoulder and upper limb injuries were the most common types of injuries among hospitalised motorcyclists (36%) and lower limb injuries were the second most frequent (28%). However, lower limb injuries were more severe, accounting for 31% of total bed-days, compared to only 18% for shoulder and upper limb injuries. Pedal cyclists also commonly had shoulder and upper limb injuries, but they were more likely than motorcyclists to have head injuries (presumably because of a lower helmet wearing rate). In comparison, head injuries were more common among pedestrians and car drivers and car occupants mainly sustained head and thorax (chest) injuries.

Overall, 91% of hospitalised motorcyclists were male, similar to the 95% of those killed (ATSB, 2007). The ways in which the data are presented make it difficult to directly compare the age profile of hospitalised and killed motorcyclists at the national level. However, it appears that in 2003-04, the 26-39 year age group was more strongly represented in fatalities than serious injuries and the under 25 year olds were more strongly represented in serious injuries than in fatalities.

3.2 MOTORCYCLE CRASH DATA IN INDIVIDUAL JURISDICTIONS IN AUSTRALIAN AND NEW ZEALAND

There is a range of useful variables regarding motorcycle crashes that are available in the State road crash databases but are not regularly published nationally for fatal crashes. These include crash descriptors, and rider descriptors such as licence status. For this reason, data from individual jurisdictions are presented in this section.

3.2.1 ACT data

In the 12 months ended 31 October 2006, the ABS Survey of Motor Vehicle Use (ABS, 2007) showed that there were 8,027 motorcycles registered in the ACT, an increase from 7,055 the previous year (ABS, 2006). Motorcycles comprised 3.6% of registered vehicles in the ACT, similar to their proportion nationally. On average, each motorcycle in the ACT travelled only about 4,500 kms per year compared to about 13,300 kms per passenger vehicle per year ([http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/4FBD90C50E075E86CA25707C0078F044/\\$File/13078_2005.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/4FBD90C50E075E86CA25707C0078F044/$File/13078_2005.pdf)). Many riders ride less distance than average, with the outcome that many riders (even those who have held a licence for many years) may still be inexperienced.

The Traffic Crash Report for 2005 (TAMS, 2006) provides a summary of data for the ACT. In 2005, there were 8 motorcyclists killed, 18 admitted to hospital and 46 received

medical treatment. Motorcyclists comprised 23.2% of all persons killed and admitted to hospital and 12.6% of the persons injured in crashes. Motorcycles and scooters were involved in less than 1% of all property damage crashes.

Less than 5% of riders injured were not wearing a helmet. Almost two-thirds (62.8%) of motorcycle and scooter crashes were multiple vehicle crashes. The most common types of multi-vehicle crashes were rear-angle collisions and right-angle collisions. Single vehicle crashes most commonly involved a fall from a vehicle, on-carriage crashes and striking objects. Almost half of the motorcycle crashes occurred where there was no traffic control, a similar fraction to that for all vehicles.

3.2.2 New South Wales

Motorcyclists were the only group where the number of fatalities did not decrease from previous years in 2004-2006. Motorcycle fatalities had a slight increase (1.6%) compared with decreases for other road users, ranging from 8.3% for pedal cyclists to 27% for passengers (RTA 2007).

The most recent information on fatal, injury and non-injury crashes in NSW is for 2005 (RTA, 2007).

In 2005, 12.6% of all road fatalities were motorcyclists, similar to the national average. Motorcyclists made up only 8.3% of all road users injured, reflecting the greater severity of motorcycle crashes compared to other vehicle crashes.

Similar to Australia-wide fatality figures (see section 3.1), Table 3.3 shows that in NSW, the largest number of rider casualties was in the age group 30-39, although combining the 21-25 and 26-29 age groups to form the 10-year range from 21-29 would comprise 624 casualties.

Table 3.3 All casualties, road user class, sex and age in NSW, 2005. From RTA (2007).

		Age (years)											
	Sex	0-4	5-16	17-20	21-25	26-29	30-39	40-49	50-59	60-69	≥70	Unknown	Total
Motorcycle rider	M	0	45	191	341	230	457	355	180	41	14	31	1,885
	F	0	2	9	27	26	43	21	10	2	0	4	144
	Sub-total ¹	0	47	200	368	256	500	376	190	43	14	43	2,037
Motorcycle passenger	M	0	4	2	10	3	1	4	0	0	0	9	33
	F	1	7	6	10	10	19	18	10	2	0	7	90
	Sub-total ¹	1	11	8	20	13	20	22	10	2	0	19	126

While licences held is not a good indicator of motorcycling activity, NSW casualty rates per 1,000 licences held show a reduction with age (see Table 3.4) that is consistent with the national finding of reductions in fatality rates per 100 million kilometres travelled with age.

Table 3.4 Licence holders, rider casualties and casualty rates per 1,000 licences in NSW, 2005. From RTA, (2007).

Age (years)	Licence holders	Rider casualties	Casualties per 1000 licences
<=16	157	47	299.36
17-20	5023	200	39.82
21-25	17021	368	21.62
26-29	22317	256	11.47
30-39	88763	500	5.63
40-49	124924	376	3.01
50-59	100544	190	1.89
60-69	39657	43	1.08
>=70	15261	14	0.92
unknown	-	43	-
Total	413667	2037	-
Total (omitting unknown)	413667	1994	4.82

Note: Only motorcycle rider casualties (killed and injured) are included. Motorcycle passengers are not included.

The percentage of NSW motorcycle crashes that were single vehicle crashes was somewhat lower than the 49% of fatal crashes Australia-wide that involved only one vehicle. In NSW in 2005, 34% of fatal crashes were single vehicle and 41% of injury crashes were single vehicle. Overall, including the small number of reported non-injury motorcycle crashes, 38% of motorcycle crashes were single vehicle. The lower number may reflect the NSW RTA practice of not including crashes involving pedestrians as single vehicle crashes.

The RTA has produced a document *Motorcycle safety: Issues and countermeasures* that provides useful data (RTA, 2004). It notes that 66% of motorcycle casualty crashes occur on weekdays, with almost a quarter of crashes occurring from 3pm to 7pm. The remaining third of motorcycle crashes occur on the weekend, with about half of these occurring between 11am and 5pm. Using the RTA's definition, fatigue was a factor in 7% of motorcycle riders in fatal crashes in 1998-2002. This was lower than the 12% of fatal crashes of other motor vehicle controllers (largely car drivers) that involved fatigue (RTA, 2004).

3.2.2.1 Licence status

Licence status is one of the variables that is available in the State road crash databases but is not regularly published nationally for fatal crashes.

The number of motor vehicle controllers involved in crashes in 2005, their licence status and the degree of the crash is presented for both car drivers and motorcycle riders in Table 3.5. These figures have not been adjusted for the total number of riders who hold each type of licence in NSW (licence status), therefore, not surprisingly, controllers with a standard licence type were involved in more crashes than controllers of any other licence type. However, the table does show a large difference between the number of learner controllers and number of provisional controllers involved in crashes and the direction of this difference for motorcyclist versus car drivers. These figures highlight the fact that rider operators are more likely to be involved in a crash in the learner stage of riding rather than in the provisional stage of riding. This is counter to the driver operator figures that show drivers are involved in many fewer crashes while holding a learner licence than

drivers holding a provisional licence. It is therefore important that initiatives continue to target inexperienced motorcycle riders.

Table 3.5 also shows the relatively large number of unlicensed motorcycle riders in fatal and injury crashes compared with car drivers. This pattern has also been found in Queensland (Watson & Steinhardt, 2007).

Table 3.5 Motor vehicle controllers involved, road user class, licence status and degree of crash in NSW, 2005. From RTA (2007).

Road user class	Licence status	Degree of crash			
		Fatal crash	Injury crash	Non-casualty crash	All crashes
Car driver	Learner	5	274	439	718
	Provisional ²	68	4,178	7,530	11,776
	Standard	318	17,769	26,971	45,058
	Unlicensed ¹	29	712	849	1,590
	Unknown ²	8	2,610	3,440	6,058
	Sub-total	428	25,543	39,229	65,200
Motorcycle rider	Learner	4	201	15	220
	Provisional ²	3	154	28	185
	Standard	43	1,186	133	1,362
	Unlicensed ¹	24	161	11	196
	Unknown ²	0	346	34	380
	Sub-total	74	2,048	221	2,343

3.2.2.2 Interstate and overseas riders

In NSW, 2% of motorcycle riders involved in casualty crashes were from interstate or overseas. As many ACT motorists drive and ride in NSW, many of these casualties could be motorcyclists from the ACT, however, the exact number is unknown. Of the riders involved in fatal crashes, 3% were from interstate or overseas (RTA 2004).

3.2.2.3 Drink riding

Table 3.6 below shows that 15% of killed riders had a BAC of 0.050 g/100mL or more, compared with 20% of killed drivers. For injured drivers and riders, BAC was missing for 22% of each of these groups. Given the similar, although large, percentage of missing data, a comparison may still be made. For injured riders, 4% had a BAC of 0.050 g/100mL or more, compared with 5% of car drivers. Thus, given the statistical uncertainty associated with the relatively small number of injured and killed riders, the extent of alcohol involvement in car and motorcycle riders in crashes was similar. The small numbers of riders prevent an assessment of whether the BAC profile is similar for drinking riders and drivers.

Table 3.6 Motor vehicle controller casualties, blood alcohol concentration. From RTA (2007)

Road user class	Blood alcohol concentration (g/100mL)							Total
	Legal	.001-.019 ¹	.020-.049 ²	.050-.079	.080-.149	≥.150	Unknown	
(Killed)								
Car driver	137	1	0	5	10	23	15	191
Motorcycle rider	47	0	0	2	3	4	5	61
(Injured)								
Car driver	8,891	8	15	83	244	271	2,868	12,380
Motorcycle rider	1,456	2	1	11	30	34	442	1,976
(All casualties)								
Car driver	9,028	9	15	88	254	294	2,883	12,571
Motorcycle rider	1,503	2	1	13	33	38	447	2,037

1 Learner and Provisional Licence holders.

2 Learner and Provisional Licence holders, unlicensed controllers and certain categories of professional controllers.

3.2.2.4 Helmet worn

NSW collects data on the type of safety device used by the road user in crashes. In the case of motorcycle riders and passengers there are four categories, see Table 3.7 below.

Table 3.7 Motorcycle road casualties, safety device used and degree of casualty in NSW, 2005. From RTA (2007).

Road user class/ safety device used ¹	Degree of casualty		Total killed & injured
	Killed	Injured	
Motorcycle rider/passenger			
Open face (jet) helmet worn	8	234	242
Full face helmet worn	48	1,586	1,634
No helmet worn	8	84	92
Unknown	0	195	195
Sub-total	64	2,099	2,163

Although these figures show more casualties for riders who wore a full face helmet, it is not known how many riders in NSW overall wear open or full face helmets. It is likely that more riders wear full face helmets and therefore, the true figures might actually show the opposite pattern. The accuracy of the data regarding use of helmet is also problematic. Following a crash a rider or pillion may remove their helmet prior to Police arriving at the scene. In this case, the Police officer may not be able to determine with any certainty that a helmet was being worn at the time of the crash. In cases where an injury is more severe, it

would be assumed there was less chance that the rider's/pillion's helmet would be removed and thus resulting in lower levels of missing or unknown data.

3.2.3 Victorian data

There were 11,850 motorcycle riders and 715 motorcycle pillions involved in injury crashes in Victoria from 2000 to 2005 (see Table 3.8). About 45% of the crashes resulted in at least one fatality or serious injury, while the remaining crashes resulted in minor injury (Table 3.9, 3.10).

In 2005, 13.9% of all road fatalities were motorcyclists, similar to the national average. Motorcyclists made up 13.8% of all road users killed or seriously injured.

Table 3.8 Number of riders and pillions involved in crashes in Victoria 2000 to 2005 (RCIS and Webcrash).

	2000	2001	2002	2003	2004	2005	Total
Rider	1938	2028	2057	1824	1903	2100	11850
Pillion	144	137	121	103	106	104	715
Total	2082	2165	2178	1927	2009	2204	12565

Table 3.9 Number of crashes of each severity level in Victoria 2000 to 2005 (RCIS and Webcrash).

	2000	2001	2002	2003	2004	2005	Total
Fatal	46 (2.4%)	63 (3.2%)	54 (2.7%)	39 (2.2%)	38 (2.0%)	48 (2.3%)	288 (2.5%)
Serious injury	768 (40.3%)	801 (40.1%)	921 (45.7%)	800 (44.7%)	825 (44.1%)	874 (42.4%)	4989 (43.0%)
Other injury	1094 (57.3%)	1134 (56.8%)	1039 (51.6%)	952 (53.1%)	1007 (53.8%)	1140 (55.3%)	6360 (54.8%)
Total	1908 (100.0%)	1998 (100.0%)	2014 (100.0%)	1791 (100.0%)	1870 (100.0%)	2062 (100.0%)	11607 (100.0%)

Table 3.10 Number of riders and pillions at each injury severity level in Victoria 2000 to 2005 (RCIS and Webcrash).

	2000	2001	2002	2003	2004	2005	Total
Killed	46	64	56	39	37	48	290
	(2.2%)	(3.0%)	(2.6%)	(2.0%)	(1.8%)	(2.2)	(2.3%)
Taken to hospital	789	825	931	822	841	890	5098
	(37.9%)	(38.1%)	(42.7%)	(42.7%)	(41.9%)	(40.4%)	(40.6%)
Other injury	1147	1185	1104	984	1059	1197	6676
	(55.1%)	(54.7%)	(50.7%)	(51.1%)	(52.7%)	(54.3%)	(53.1%)
Not injured	100	91	87	82	72	69	501
	(4.8%)	(4.2%)	(4.0%)	(4.3%)	(3.6%)	(3.1%)	(4.0%)
Total	2082	2165	2178	1927	2009	2204	12565
	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)

3.2.4 Queensland data

In 2005, Queensland had the third highest number of motorcycle registrations (97,370), behind New South Wales and then Victoria, and leads the rest of Australia in motorcycle registrations as a percentage of all vehicle registrations, 31% (ABS, 2005). There was a 50% increase in Queensland motorbike licences (including learner permits) from June 1996 (303,800) to June 2001 (457,538), with a further increase to 522,701 at June 2005. As at 21 November 2005, there were 541,026 people licensed to ride motorbikes in Queensland (including learner permits) (Queensland Transport, 2005).

Given the increase in motorcycle registrations and licences in Queensland, it is not surprising that the number of fatalities and their proportion of the state road toll have increased. The number of motorcycle riders and pillions killed in Queensland increased from 29 in 2001 to 64 in 2005, before decreasing to 58 in 2006. The number in 2007 will be higher, because there were 68 motorcyclists killed as at 25 November 2007 (<http://www.transport.qld.gov.au/Home/Safety/Road/Statistics/>). In 2002 motorbike riders and pillions comprised 16.4% of road crash fatalities in Queensland but this increased to 19.5% in 2005 (ATSB, 2006) before falling to 17.3% in 2006.

Queensland Transport statistics for the period 2000 – 2005 indicate males aged 30 – 39 years are most likely to be involved in a motorcycle crash, with 846 casualties in this category (Queensland Transport, 2005). Males aged 17 – 24 years were the next category most represented, with 823 casualties for the period (Queensland Transport, 2005).

There has been a general increase in the numbers of motorcyclists hospitalised, from 548 in 2000 to 800 in 2004. This parallels the increase in fatalities.

An analysis of Queensland crash data for 2001-2005 was undertaken using the Webcrash2 program. Figure 3.3 shows that there were relatively few motorcycle rider and pillion casualties between midnight and 6am and that the number of casualties peaked in the late afternoon.

When the Queensland fatigue definition was applied to the rider and pillion casualties, a total of 136 (1.9%) were identified as 'fatigue-related' (although 5.7% of fatalities were 'fatigue-related'). The bulk of these 'fatigue-related' casualties occurred between 2pm and 4pm when there is a relatively large amount of riding, compared to night-time (Haworth & Rowden, 2006).

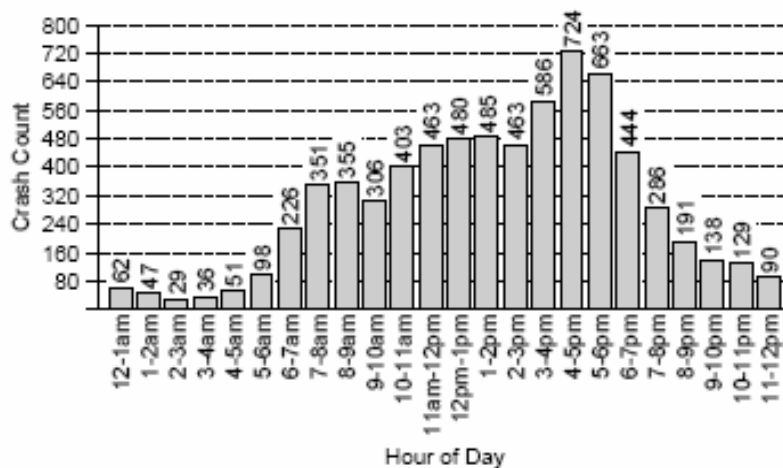


Figure 3.3 Motorcycle rider and pillion casualties by time of day, Queensland 2001-2005 (source Webcrash 2, Queensland Transport).

Of the 64 motorcyclist fatalities in 2005, the most commonly identified factors in these crashes were speed (30%), inattention (30%) and alcohol/drugs (17%). Some of the crashes coded as involving inattention may have involved fatigue.

3.2.4.1 Mopeds

Mopeds can be ridden by holders of a car licence in Queensland. Analyses of merged crash and registration data found that the number of moped crashes increased from 25 in 2001 to 97 in 2005 (Haworth & Nielson, 2007). Most crashes resulted in hospitalisation (43%) or medical treatment (38%) and occurred between 6am and 6pm, on weekdays in low speed areas. Overall, 50.8% of crashes occurred at intersections and 32.3% were single vehicle crashes. The most common crash types were collisions between vehicles travelling in the same direction (24.8%), loss of control on a straight road (23.1%) and collisions between the moped and another vehicle on an adjacent approach to an intersection (18.2%).

The ratio of motorcycle to moped crashes was about 19:1 but moped crashes increased at a greater rate during 2001-2005 (260% versus 71%). Moped crashes were more likely to occur in tourist areas, on weekdays and in low speed zones than motorcycle crashes. The distributions of crash severity were similar. Moped crashes more often involved loss of control on a straight road (23.1% versus 12.7%) while motorcycle crashes more often involved loss of control on a curve (13.6% versus 5.0%). Moped riders in crashes were

much more likely than motorcycle riders to be female (37.9% versus 7.2%) and younger and hold an interstate (10.8% versus 1.3%) or overseas licence (7.8% versus 0.7%).

3.2.5 New Zealand data

The New Zealand Ministry of Transport have produced a summary of motorcycle crash statistics for 2006 (<http://www.mot.govt.nz/assets/NewPDFs/Motorcycle-Crash-Factsheet-July-07.pdf>). It shows that in 2006, 38 motorcyclists were killed and a further 1017 were injured in road crashes in New Zealand. This was 10 percent of all deaths and 7 percent of all reported road crash injuries. The number of fatalities has increased steadily from 28 in 2003 and the number of injuries has increased from 761 in 2003.

The majority of motorcyclists killed and injured in 2006 were aged 25 and over. In recent years there has been a marked fall in deaths and injuries involving motorcyclists aged under 25, but not in the older group.

For more serious crashes, the motorcyclist was more likely to have the primary responsibility for the crash. The motorcycle rider had the primary responsibility for nearly three-quarters of fatal crashes compared to about half for minor injury crashes. This partly reflects the different crash types making up fatal and injury crashes. Single vehicle loss of control and run off road were involved in 30% of fatal crashes and 28% of injury crashes, with head on crashes making up 25% of fatal crashes and only 6% of injury crashes. In contrast, intersection crashes comprised only 25% of fatal crashes but made up 40% of injury crashes. The motorcyclist was considered responsible for only a minority of the multiple vehicle crashes.

Risk taking is a major contributor to fatal crashes. Twenty-four percent of motorcyclists involved in fatal crashes were affected by alcohol/drugs. Thirty-nine percent of motorcycle riders involved in fatal crashes were travelling too fast for the conditions. Forty-seven percent of all motorcycle riders involved in fatal crashes were travelling too fast for the conditions or affected by alcohol/drugs or both.

The peak times for motorcycle accidents are between 12 noon and 4pm on Saturdays and Sundays and between 4pm and 8pm, Monday to Friday.

3.2.6 Other sources of data

Third party insurance data, like hospital data, can potentially provide more useful information regarding injuries and the cost of crashes than Police-reported crash databases. It can also identify sub-groups where the cost of the claims is greater for a given severity of injury, compared to other sub-groups. For instance, the costs of claims for motorcycle riders in their 30s and 40s may be greater than for younger riders because the older riders have higher incomes or more dependants.

However, the scope of coverage of crashes depends on whether the scheme is a fault-based scheme or a no fault scheme. In NSW, which has a fault based scheme, Christie and Harrison (2001) noted that there were about half as many claims in the Motor Accident Authority database as the number of motorcycle crashes in the RTA accident database. In addition, the ability to identify trends may be affected by changes in rules relating to eligibility to claim.

Other sources of data regarding road crashes include records of vehicles towed away which are maintained by the Tow Truck Allocation Scheme and a number of registers of serious

injury. These registers collect detailed information on particular types of injury (e.g. multiple trauma, spinal cord injuries or head injuries), some of which result from road crashes. Currently these registers provide detailed information but lack coverage of the population.

3.3 THE RELIABILITY OF MOTORCYCLE CRASH DATA

Measures of the size and characteristics of the motorcycle crash problem are only as reliable as the data on which they are based. Most analyses that have been reported implicitly assume that those crashes which occur are reported to Police (or are no less likely to be reported than crashes of other groups), that Police descriptions of what happened in the crash are accurate and that the measures of the amount of motorcycling activity used in denominators of crash and injury rates are appropriate. Both motorcycle groups and some researchers (Diamantopoulou, Brumen, Dyte & Cameron, 1995; FORS, 1999; Haworth, 2003) have challenged these assumptions. In Great Britain, the Advisory Group on Motorcycling (undated) cited under-reporting of crashes, Police underestimation of crash severity and discrepancies in the total numbers of motorcycles from different data sources as issues affecting the understanding of motorcycle safety.

Some motorcyclists question the accuracy of Police descriptions of crashes. They believe that many crashes described in Police accident report forms as single vehicle crashes were actually caused by a motorcyclist failing to successfully avoid a car or truck that then drove off. They are also concerned that incorrect interpretation of skid marks by Police can result in some motorcycle crashes being miscoded as involving excessive speed. They also consider that the crash reporting system fails to take account of road conditions contributing to motorcycle crashes (de Rome, Stanford & Wood, 2002).

4. MOTORCYCLE SAFETY SYSTEMS AND PROGRAMS IN AUSTRALIA AND NEW ZEALAND

A broad range of motorcycle safety initiatives exist in Australia and New Zealand. These vary from statewide licensing and training systems run by government licensing and transport agencies to safety programs run in small communities and by individual rider groups. Chapter 4 begins with a discussion of the mechanisms by which the programs can improve motorcycle safety. It then describes the various types of initiatives and identifies motorcycle safety systems and programs undertaken in Australia and New Zealand in the last five years.

4.1 MECHANISMS FOR IMPROVING MOTORCYCLE SAFETY

There are a number of means by which motorcycle initiatives deliver the message and improve safety. Many programs aim to convey a single message, however, use a mixture of delivery modes to disseminate the message. Other programs find a means for delivering motorcycle safety messages and combine a number of topics into one form of delivery.

The focus in this report is on programs that have a stated aim of improving motorcycle safety. However, sometimes there are programs that inadvertently have either a positive or negative effect, where there was no original aim to affect motorcycle safety. For example, provision of improved motorcycle parking can create an area attractive for motorcyclists to go, this area might be safer, encouraging riders to travel away from less safe areas to safer ones, or might even encourage riding, in turn increasing exposure and adding to the motorcycle safety problem.

Some safety measures bring about reductions in the number and severity of crashes by reducing the amount of the activity being undertaken (often termed exposure reduction) or by ensuring that the activity is undertaken more safely (often termed risk reduction). Both of these measures are essentially crash prevention initiatives, while risk reduction is an initiative that can also work to reduce the severity of injury in the event of a crash. It is not always possible to neatly separate the effects of risk reduction and exposure reduction.

The remainder of Chapter 4 attempts to identify those initiatives, programs and activities which are likely beneficial to improving road safety and reducing road trauma to motorcyclist. Not all programs that have been identified will be discussed in Chapter 4. Appendix 1 attempts to list a variety of programs undertaken over the last five years. Chapter 4 describes the positive components and likely beneficial aspects of programs under each program topic and then provides examples of these.

Earlier in the report (Chapter 1) six factors were identified as contributing to the over-representation of motorcycles in serious crashes (from Haworth, Mulvihill & Clark, 2007). These important safety issues will form the structure to the remainder of Chapter 4. Under each of these heading, the measures used to improve motorcycle safety in these areas will be discussed. Programs will be identified in relation to whether they are a road user based program, a vehicle or environmental based program. The order in which the six factors are discussed is crash prevention measures firstly, followed by programs to reduce injury and then programs which improve treatment after a crash has occurred.

4.2 INEXPERIENCE OR LACK OF RECENT EXPERIENCE

The most common approaches to address inexperience or lack of recent experience in riders are licensing and testing, training and enforcement. Often public education programs utilising advertising campaigns are run by state agencies in support of new licensing and enforcement initiatives.

4.2.1 Licensing

Licensing systems in Australia are administered by state government licensing and transport agencies and in New Zealand, through Land Transport NZ. As it is compulsory to hold a licence to ride a motorcycle, licensing initiatives have the greatest potential to reach the largest number of motorcyclist of any type of safety program. Although reaching many riders, the safety effectiveness depends upon the components of the system.

New graduated licensing systems are being introduced in many Australian jurisdictions during 2007 and 2008. New Zealand currently has a three stage graduated system. The components in each system vary across jurisdictions, however, those components which have the greatest potential to improve motorcycle safety are listed in Table 4.1 below. The table provides a summary of research and presents best practice components of a licensing system. The table describes the effect on crash risk; the effect on crash severity; the effect on amount of riding; and the reason for effect of each component. The far right hand column indicates whether this is current practice in the ACT.

With regard to testing, QLD, WA and NT all have an on-road testing component. As described in Table 4.1, this would ensure a basic level of competency and may reduce the amount of riding by making obtaining a licence less attractive.

A hazard perception test is a component of the licensing system in most Australia jurisdictions. ACT riders do not currently have to undertake a hazard perception test. Although as yet this test is not specific to motorcyclists, the test would provide an assessment of a basic level of competency in this area.

4.2.2 Training

For many road safety agencies, rider training is the main focus of motorcycle safety efforts, particularly for addressing the issues of inexperience and lack of recent experience. For many jurisdictions, training and testing is outsourced to private companies. However, the training and testing requirements are set out by the state licensing authority.

In New South Wales and Tasmania, training is compulsory to obtain both a learner and probationary motorcycle licence. In the ACT and SA, training is compulsory to obtain a learner permit, however, not compulsory to obtain a probationary licence.

There is no strong evidence in support of training leading to marked improvements in rider safety (Haworth & Mulvihill, 2005). An international review of motorcycle training concluded that compulsory training through licensing programs produces a weak but consistent reduction in crashes (TOI, 2003). However, the evidence suggests that voluntary motorcycle training programs do not reduce crash risk (TOI, 2003). On the contrary, these programs seem to increase crash risk. This may be due, in part, to the increased confidence felt by many riders who have completed training, despite minimal improvements in rider skill. Such riders may therefore take more risks in situations where they lack the skills to safely avoid a crash.

Table 4.1 Summary of best practice components for motorcycle licensing system

Component	Effect on crash risk	Effect on crash severity	Effect on amount of riding	Reason for effect	Is this current practice in the ACT?
GENERAL					
No exemptions from licensing, training or testing requirements for older applicants	Facilitates other measures	Facilitates other measures	↓	Older riders need to develop riding-specific skills. May make licensing less attractive.	NO: Exemptions are made for older applicants and those who already hold a car licence.
LICENSING					
Minimum age for learner and provisional motorcycle licences higher than for car licences	↓		↓	Consistent with graduated licensing principles. Crash risk has been demonstrated to decrease with age among young novices. Increasing the minimum age would also almost eliminate riding and therefore crashes among riders below this age.	YES
Zero BAC for L and P	↓		↓	Reducing drink riding will reduce crash risk. Zero BAC will also reduce the amount of riding after drinking.	NO: 0.2% for L & P
Restrictions on carrying pillion passengers for L and P	↓	↓		Pillions have been shown to increase crash risk and severity.	YES: for L, and P in first 12mths
Power-to-weight restrictions for L and P	↓ (severe crashes)	↓	↓	Crash risk may be reduced if less powerful motorcycles result in less deliberate speeding and risk taking or problems with vehicle control. Restrictions may dissuade some potential high-risk riders from riding.	Yes
Minimum periods for L and P	Facilitates other measures	Facilitates other measures	Unknown	To ensure that other requirements have sufficient duration.	Yes

Component	Effect on crash risk	Effect on crash severity	Effect on amount of riding	Reason for effect	Is this current practice in the ACT?
Maximum period for L	Facilitates other measures	Facilitates other measures	Unknown	To prevent riders who are unable to pass licence test being permanent learners. May act as an incentive to obtain practice in order to pass the test.	YES: 2 yrs
Display L and P plates	Facilitates other measures	Facilitates other measures	Unknown	To assist in enforcement of conditions and restrictions.	
Following supervisor for Ls	↓	↓	↓	Provide feedback and reduce high-risk behaviour. Limited availability of supervisors might reduce riding.	NO: No supervisor required
TESTING					
Off-road testing to obtain L, on-road testing for P	Unknown	Unknown	↓	Ensure a basic level of competency. May make licensing less attractive.	No on-road test in ACT
Hazard perception testing	Unknown	Unknown	Unknown	A deficit of hazard perception & responding increases crash involvement in inexperienced riders. No relationship found between current hazard perception testing & crash involvement.	

In attempting to define the scope of the motorcycle safety issue Haworth and Mulvihill (2005) completed a review of motorcycle licensing and training methods throughout Australia. The authors argue that motorcycle riding requires higher levels of vehicle control and cognitive skills in comparison to car driving and suggest that future motorcycle safety initiatives need to incorporate activities promoting higher level cognitive and control skills. The components of training which were identified as best practice and as having the greatest potential to improve motorcycle safety are outlined in Table 4.2.

The remainder of this section provides examples of training programs which are likely to improve motorcycle safety and reduce road trauma to inexperienced motorcyclists and those with a lack of recent experience. Some of these programs address the motivational and cognitive skills which most other training programs fail to do.

Table 4.2 Summary of best practice components for motorcycle training

Component	Effect on crash risk	Effect on crash severity	Effect on amount of riding	Reason for effect	Is this current practice in the ACT?
TRAINING					
Compulsory training to obtain L and P	Small reduction	Unknown	↓	Ensure a basic level of competency. May make licensing less attractive.	Yes for L, no for P
Increased roadcraft training at both L and P (may require longer training duration and better educational skills of trainers)	↓	↓	↓	Improved ability to detect and respond to hazards by novice riders. Longer and potentially more expensive training may deter some applicants.	NO
Off-road training for L, mix of on- and off-road training for P	↓	↓	↓	Ensure a basic level of competency gained under situations that are appropriate for current level of competency. Allow safe practice of responses to hazards. Longer and potentially more expensive training may deter some applicants.	

4.2.2.1 Training courses for novice riders

Most training courses that precede the issue of a learner permit are between 6 and 16 hours in duration, while most courses that precede the issue of a licence are between 6 and 12 hours in duration (Haworth & Mulvihill, 2005). In Victoria for example, most learner and licence motorcycle training programs have a duration of 16 hours or less, and many are one-day courses. Q-Ride in Queensland provides an example of competency based training and the duration varied depending on prior experience of the student. Raw beginners take an average of 11.75 hours to achieve the Q-RIDE certificate of competency and experienced riders took an average of 5.75 hours (Haworth, Greig & Wishart, 2007).

Many authors have concluded that the apparent lack of success of rider training in reducing accident risk or number of violations may stem from the content of the training programs (Chesham, Rutter & Quine, 1993; Crick & McKenna, 1991; Haworth, Smith & Kowadlo; 1999; Reeder, Chalmers & Langley, 1996; Simpson & Mayhew, 1990). Rider training programs currently in use focus mainly on the development of vehicle control skills. This is not necessarily through choice but is often brought about through time constraints and the need to prepare a rider for an end test that is skill-based. As well as covering practical skills, many learner courses do cover knowledge training and some training may include a cognitive skills component in the practical skills. The extent of cognitive skills components in the knowledge training is dependent on the instructor.

The following are examples of training programs which are likely to improve motorcycle safety and reduce road trauma to inexperienced motorcyclists and those with a lack of recent experience.

A Queensland training and licensing system, Q-RIDE, was introduced as an alternative method of obtaining a motorcycle licence through competency-based training and assessment delivered by a Q-RIDE Service Provider. Q-RIDE requires licence applicants to demonstrate the knowledge, skills and attitude needed for the safe operation of a motorcycle. 'A competency refers to an individual's demonstrated knowledge, skills or abilities (KSAs) performed to a specific standard. Competencies are observable, behavioural acts that require a combination of KSAs to execute' (Queensland Transport, 2001).

In Victoria, there exists the option in legislation to obtain a restricted licence without first obtaining a learner permit by completing a combined learner-licence course. This is referred to as the 'Four-day learner and licence course' or 'Four-day direct to licence course'. The combined, single training and test for a motorcycle licence is a four-day course that has been developed, but is not currently offered by any of the providers. The course provides a structured and incremental approach to the acquisition of cognitive and vehicle control skills necessary for safe operation of a motorcycle in traffic. The course aims to develop an understanding of the characteristics of a motorcycle before progressing to an understanding of the road system and layout and finally an understanding of the behaviour of other road users. The course also incorporates the repetition of vehicle skills exercises to accumulate sufficient skill before being allowed to ride on the road (Haworth, Smith and Kowadlo, 1999).

The course is not currently offered by training providers because of a perception that its higher cost would make it unattractive to trainees. The requirement to rearrange their current course structure as well as add content to their current curriculum might also be possible barriers to implementation for the providers.

4.2.2.2 Post licence training

A range of post licence training exists including on-road risk management, and courses for returning riders, intermediate and advanced courses, superbike courses and race courses. It is important to consider whether there is potential for some of these courses to encourage over-confidence in riders. Some advanced courses use motorcycle race champions to promote the training, in turn, this may be promoting a race attitude rather than a safety attitude and produce overconfidence in some riders.

The following are examples of post-licence training and activities which are unlikely to encourage over-confidence or riding exposure and likely to improve motorcycle safety.

ACT-NRMA & HART 'Ride 'n Thrive' On-road risk management course: "The one day course is designed to enhance motorcyclists' abilities to share the road with other road users safely. Concepts such as observation and anticipation are discussed as well as techniques for road positioning, space selection and managing fatigue. A 200-250 km ride over varied road environments will provide the reality component of the course. "The course is designed for riders at all levels of competency and costs \$90. A ratio of six riders per instructor will ensure each rider has ample opportunity to enhance their risk management techniques.

Brisbane area Ulysses motorcycle club members were able to obtain post licence training courses from Team Moto free of charge. This one day program consisted of an information component followed by an afternoon training session at Mt Cotton Training Centre.

4.2.2.3 Training courses for returning riders

While there are many post-licence training courses available, there are relatively few training courses designed specifically for returning riders.

The Mature Age Skills Training for Experienced riders (MASTERS) course conducted through the Motorcycle Riders Association of the ACT and Stay Upright training is aimed at enhancing the safety of mature aged riders (30 years and onwards). The NRMA-ACT Road Safety Trust subsidises half the cost of the course. The course consists of a mixture of classroom sessions and practical manoeuvres over one and a half days over a weekend.

4.2.2.4 Other educational initiatives for inexperienced riders

In addition to face-to-face training programs, a number of educational packages have been developed for inexperienced riders.

State licensing agencies often run campaigns and produce educational packages to support changes made the licensing system. It appears that the purpose for this is to increase acceptance and compliance to new changes. The form of deliver is often television advertisements which also send the message to other road users. Road licensing and safety agency web sites are most common means to access this information.

The ‘Ride Smart’ training CD produced by TAC is a supplement to on-road riding practice. It features real life situations that all riders encounter on the roads. The CD is available free of charge to all Victorian motorcycle riders and can ordered on-line and is delivered via the post. The product is being made available to accredited motorcycle training providers to distribute to students undertaking compulsory training courses, encouraging all riders to complete the program. “Ride Smart” provides an example of effective means of delivery using a combination of methods.

Queensland Transport has a similar package which is distributed to Queensland motorcycle riders.

The RTA has developed a brochure entitled 'Braking habits' which is available from Council and many motorcycle retailers. Material can be downloaded from the RTA website

4.2.3 Ride guides

Ride guides often cover a range of topics aimed at preventing crashes, reducing injury severity and improving treatment if a crash does occur. However, more often the focus is on the rider themselves and the environment in which they are riding in. Thus, ride guides often address the issue of inexperience with a particular route, rather than general riding inexperience. Many guides are a form of tourist promotion and improving safety is only one of many aims of the publication.

Ride guides often take the form of brochures, booklets and articles in magazines. More recently, some more sophisticated ride guides have become available on DVD or can be viewed on YouTube.

Examples of ride guides include: The ‘Snowy –Illawarra’; The ‘Great Ocean Road Ride’; ‘Motorcycling the Hunter’ and “Motorcycling the southern way. Ride guide”.

4.3 RISK TAKING

Risk taking in motorcyclist incorporates a variety of behaviours including deliberately not following road rules (including excessive speeding), drug and alcohol use while riding and riding un-helmeted. With this diversity of behaviours incorporating risk taking, there are also a diversity of types of programs to address this issue. Although the range of programs is wide, there number of programs is actually few in comparison to other areas of motorcycle safety.

Power-to-weight restrictions for learner and probationary riders are best practice components of a licensing system (see section 4.1.1). Crash risk may be reduced if less powerful motorcycles result in less deliberate speeding and risk taking or problems with vehicle control. Restrictions may dissuade some potential high-risk riders from riding.

Training has the potential to play an important role in reducing risk taking in motorcyclists. Section 4.2.1 provided examples of training which are likely to improve motorcycle safety particularly for those with little experience or little recent experience. As pointed out by Koch and Brendicke (1990, cited in Elliott et al., 2003) training needs to deal with the contradiction that ‘what we teach asks for an *avoidance* of risk-taking whereas young people in society *validate* and *reward* risk taking.’

Training and licensing initiatives have great potential to reduce risk taking in motorcyclists. These programs can reach a large number of riders and provide opportunity to address rider attitudes and intern effect behaviour. Television and radio advertisements have the ability to reach many riders and provide a message in through a visual and audible means, however, these initiatives are not often used to address risk taking in motorcyclists. Well designed public advertisements which utilising these tools might be a powerful way in which to target behaviour.

Other programs include those run in local communities. Many of these types of programs often utilise local police enforcement measures combined with awareness information to tackle risk taking among riders. These are generally programs targeted at known, specific motorcycle routes. Although these measures are useful by showing a police presence, and using enforcement as a deterrent to risk taking behaviour at that site on that day, there are a number of drawbacks that come with this process. Where specific sites are targeted, riders who are likely to take risks are also likely to change the location where they ride. These riders may deliberately avoid that route if they have prior knowledge that the program is taking effect on that day. Any safety messages promoted through that program will be lost to these riders. If riders have no prior knowledge of the enforcement and do ride in that location, they are likely to simply change their riding location next time they ride, moving the problem elsewhere and when the program has been completed, the problem often returns.

Programs run in local communities can be a very effective method to address local safety issues. Initiatives run by state and federal agencies generally do not adapt the message and delivery of a program to suite a local issue. This makes local programs very important to improving motorcycle safety. However, these programs do not have as many resources as state and federal programs and therefore, some of these local programs are not always as well coordinated. Often their safety message is accurate and relevant to a local problem, however the program may not be delivered in such a way that the safety message effectively reaches the target group. Sometimes, inaccurate information is produced, and there are fewer checks and balanced before the message is delivered.

A downfall of many current initiatives is that there is a lack of collaboration between state road safety agencies, local community groups and rider groups. With collaboration, there is more potential for success with greater sharing of information to ensure only accurate messages are disseminated. With collaboration there is greater opportunity to build rapport between motorcycle riders and those who design and implement motorcycle safety programs. Unfortunately, this collaboration is currently limited.

The remainder of section 4.2 provides examples of activities which are likely to reduce risk taking behaviour and improve motorcycle safety.

4.3.1 Educational initiatives to reduce drink riding

Motorcycle riders involved in fatal crashes who are intoxicated have been shown to be almost twice as likely as sober riders to be riding too fast or be unhelmeted (FORS, 1997). This provides evidence that riders who exhibit risk taking behaviour in one area of riding often take other risks at the same time.

Of the programs that address risk taking, alcohol use along with excessive speed are areas addressed more often than issues such as drug use, un-helmeted riding or other risk taking behaviours such as deliberately not following the road rules.

In 2005, the TAC designed a mass media communication initiative to draw attention to weekend riders and those who socialise through group rides, that alcohol and riding don't mix. The message is communicated through printed materials located where riders frequently take rest breaks and comfort stops (e.g. cafes, pubs, toilets). The advertisements are also used at the TAC's sponsorship-linked activities at the Australian Motorcycle Grand Prix held on Phillip Island where the key message is 'Drink, ride, bloody idiot'. The material also serves as a reminder to riders who know better than anyone else that drinking kills riding skills (TAC, 2007a).

The TAC promote the use of the free breathalyzers which are located at many of the clubs and facilities at the Grand Prix venue. The TAC's website has a specific Motorcycle Grand Prix information page which provides safety tips for getting to the venue, motorcycle safety around the island where the event is held and getting home.

The RTA's 2002-2003 public education campaign produced a very useful poster (see below). This poster was placed on bus backs, in-venue, and outdoor advertising, as well as mailouts to motorcyclists and promoted on radio.



The RTA's website also provides valuable information about drinking and riding and drinking and driving. Although information on a website may not be the best form of delivery to address the target audience, it is a resource which provides accurate information from which rider and community groups can access up to date resources. Other important internet information resources such as this include the TAC and the VicRoads websites. Other websites include the Motorcycle riders Association of the ACT; the Department for Transport, Energy and Infrastructure South Australia; the Office of Road Safety Western Australia; Queensland Transport; and the Northern Territory government websites.

A Queensland program address drink riding has been implemented in the Far Northern Working Group Area and was initiated by Queensland Transport. The program consists of the distribution of accurate information on standard drinks and promoting road safety messages through the media and roadside signs. The program targets those people registering motorcycles, obtaining learners permits and renewing licenses, and customers of motorcycle dealerships and stores selling related equipment.

The websites of the Office of Road Safety Western Australia (<http://www.officeofroadsafety.wa.gov.au/index.cfm?event=topicsDrinkDriving>) and Transport SA (http://www.transport.sa.gov.au/rss/content/safer_people/issues/drink_driving_05_06.htm) also address riding and alcohol.

4.3.2 Enforcement programs

Police report difficulties in enforcing motorcyclist compliance with road rules, particularly in relation to inability to identify speeding motorcycles from the front using speed cameras (because they do not have frontal identification) and because of the difficulty and dangers in apprehending riders who are travelling at extreme speeds. Much of the enforcement of motorcyclists relates to detection of unlicensed riders or unregistered motorcycles.

The Queensland Police Service conduct a variety of enforcement initiatives aimed at improving the safety of motorcyclists. A number of specifically targeted enforcement

operations have been undertaken in the South East Queensland region along designated popular motorcycle routes. These routes have also been previously identified by Queensland Police Service as within areas representing high fatality rates for motorcyclists in conjunction with high levels of risky motorcycle riding behaviour.

In Far Northern Queensland a program to increase licensing enforcement was undertaken with the aim of increasing licensing checks and consists of Queensland Police conducting licensing checks at identified crash zones. The program is currently operating in the Far Northern Working Group Area under the supervision of Queensland Transport.

The 'Victorian Motorcycle Road Safety 2002-2007' identified the excitement of motorcycling as part of eight key motorcycle safety issues. It is noted that riding that is inherently more exciting, such as riding on winding mountain roads at high speeds, and that this is potentially dangerous. To address the issue, the strategy states: "Develop local government programs to address motorcycle crash problems in specific municipalities". One component was to "Provide support for local publicity programs and targeted police enforcement in municipalities participating in the motorcycle local government program".

4.3.3 Riders not wearing a helmet

Few programs target helmet use. This may be due to the high compliance with helmet wearing in Australia. There is, however, information available which promotes the use of helmets. Most often this information is in the form of internet recourse through state government road safety agencies. For example, Queensland Transport provides information on the enforcement and consequences for both riders and their pillion passengers for not wearing a helmet.

4.4 DRIVER FAILURE TO SEE MOTORCYCLES

Measures to improve this issue involve other road users as well as riders, and the vehicles in which they drive and ride. The programs with the most potential to have a positive impact on motorcycle safety are those which deliver the message through a medium that will reach the target audience (i.e. drivers). Therefore, delivering the message through motorcycle specific organisations and to riders only is not the most appropriate method for this particular message.

It is however, important to use motorcycle specific organisations to remind riders that drivers do fail to see motorcyclists. It is just as important that riders themselves use strategies such as hazard perception and conspicuity for example, as it is for drivers to be conscious of motorcyclist. It is also important that riders take responsibility for ensuring their visibility to other road users. For example, it is beneficial that riders not put themselves in a position where a driver would not expect to see them.

Most of the programs that address the issue of drivers' failure to see motorcycles are run by state government road safety agencies. Most of the campaigns specifically targeting drivers have come in the form of either a television advertisements or in a campaign which utilised a mixture of delivery modes. Most often this mixture consists of printed slogans on buses and other outdoor advertising, radio is also used. More general awareness campaigns also use a variety of delivery modes, with program types including day rides, awareness weeks, awareness sessions, messages on the back of registration labels and again television and radio.

Television advertisements are particularly suited to this area of motorcycle safety as they have a wide reach in the community. This medium has the ability to reach ‘other road users’ as well as motorcyclists themselves. Other advantages of television advertisements include the following:

- Children and teenagers who do not yet operate a vehicle on road, but who are pedestrians and may operate a road vehicle in the future, also receive the safety message. The message then has potential to become part of society’s safety culture.
- Television advertisements also have the ability to portray realistic situations with sound, vision and motion. This has potential to provide a higher impact message than other modes of delivery.
- Although this form of delivery is associated with high monetary costs, the large number of people it reaches balances this cost.

The following sections provide examples of initiatives, activities and programs aimed at the issue of driver failure to see motorcyclist. These are examples which are likely to improve motorcycle safety in this area.

4.4.1 Advertisements addressing drivers’ failure to see motorcyclists

There has been a long history of advertisements attempting to encourage drivers to look out for motorcyclists. Some riders objected to some campaigns, claiming that their emphasis on riders being hard to see made it more likely for drivers to blame motorcyclists for crashes. Some more recent advertisements have included more detailed consultation in their development and have been better accepted. Yet there is still little evaluation beyond recall and acceptance of messages. It is still not known whether these campaigns reduce the likelihood of driver failure to see motorcyclists.

Another issue for which little information was available related to the reach of these campaigns. Even if potentially successful programs were developed, if they had little reach because of relying on public service advertisements or very limited paid advertising, then their effect may have been minimal.

The TAC ‘Vice Versa’ television campaign is an example of a campaign where significant resources were allocated to its development. The content of the advertisement was developed based on research involving novice and experienced motorcyclists. Different concepts were tested in a series of focus groups and the approach that ‘Vice versa’ took had the strongest support for the following reasons:

- it created the most empathy for riders;
- it highlighted the complexity of riding and the stresses faced by riders; and
- it had a positive message.

Surveys of audience reaction were conducted to measure the initial impact of the advertisement and to detect any changes with time with positive results (TAC, 2007b).

As a complementary program to 'Vice Versa', the TAC's 'Put yourself in their shoes' campaign addressed communication between motorcyclist and drivers and the risks drivers create for motorcyclists. The main aim was to encourage a mutual understanding that both groups have a responsibility to share the road safely. The campaign used a mixture of delivery modes. During 2004 the message was featured in two 30 second radio advertisements. These highlighted two main themes:

- the smaller size of motorcycles can make them harder for drivers to see, and
- the need for drivers to abandon negative attitudes towards motorcyclists.

In 2005 the campaign also used radio and outdoor billboards as a form of communication. The message concentrated on three high risk situations for riders involving the actions of drivers:

- vehicles at intersections turning right across on-coming traffic;
- drivers changing lanes; and
- drivers entering traffic from side streets or driveways.

The 'Put yourself in their shoes' slogan is currently posted on the TAC's web site. The webpage content is brief, however, provides very practical advice on what drivers can do to reduce the risks of a collision with a motorcycle

An unusual yet creative program to promote the motorcycle safety message was developed in the ACT. The inside of registration labels have been used as a communication tool. The slogan 'Be aware of motorcyclist' have been printed on registration labels throughout the ACT.

The RTA's 2002-2003 public education campaign included the use of bus backs to promote the look out for motorcycle message. As seen below the poster reminds drivers that motorcyclist are not always visible even when a driver uses their mirrors. This message addresses a common problem and the advertisement slogan and picture are a practical way to get the message across very quickly.



4.4.2 Motorcycle awareness campaigns

Motorcycle Awareness Weeks are run in many jurisdiction across Australia and New Zealand. A mixture of activities is usually involved and media coverage is usually included.

Motorcycle safety awareness sessions have been held in Queensland. These sessions are a public awareness program aimed at increasing public awareness of and compliance with

motorcycle safety legislation. The sessions cover issues including alcohol, speed, licensing, and modifications. The awareness sessions are followed by Queensland Police Service compliance activities. The program is currently undergoing evaluation.

The National Motorcycle Awareness Ride in Melbourne and a plan to “fill the road to Molong with motorcyclists” to raise awareness of motorcycles amongst motorists. However, it is possible that such activities may result in a negative effect on motorist attitudes towards motorcyclists

Articles posted on sales websites such as BikePoint.com.au increase the chance of riders viewing the safety message. The BikePoint example used the website to promote the Motorcycle Council of NSW Safety Week.

4.4.2.1 Rider Survivor

Rider Survivor is a motorcycle road safety and community awareness initiative between Queensland Transport, Queensland Police and CARRS-Q (Centre for Research & Road Safety Queensland) and other relevant motorcycle community stakeholders. It is designed as an information sharing community engagement program to increase levels of motorcycle road safety awareness. The intention of Rider Survivor is to use the concept as a vehicle to obtain trust and encourage communication between relevant motorcycle and road safety stakeholders with a view to working collaboratively to improve road safety for the motorcycle community. It also provides opportunities for:

- motorcyclists to have their say
- road safety stakeholders to interact with the riding community
- interaction with active motorcyclists riding along a designated and identified high risk route
- collection of survey information

Rider Survivor days are held along designated routes frequented by motorcyclists on weekends. These routes have previously been identified by transport authorities as being overrepresented in the frequency of motorcycle crashes. Each Rider Survivor day incorporates display stands promoting road safety initiatives by motorcycle community safety stakeholders. A free sausage sizzle is used as an incentive to encourage motorcyclists to stop and in a relaxed non threatening environment share their views on the ways in which motorcycle safety could be improved within the community.

The scheduled dates and locations of upcoming Rider Survivor days are promoted through various media outlets along with communication networks within the motorcycle community. Previously Rider Survivor days have been held at Mt Glorious and Canungra with future days expected to include the Sunshine Coast hinterland.

4.4.2.2 Doin' It Legal – Talk to the Blue

Doin' It Legal – Talk to the Blue is an annual community-based public awareness and education day incorporating general community road safety with a strong emphasis on motorcycle safety. Motorcycle specific displays are put on by Queensland Police and Morgan and Wacker Motorcycle Training Centre. The event commenced in 2004 and more than 4000 people attended the event in June 2005. An evaluation of “Talk to the Blue” was conducted by CARRS-Q, and overall positive feedback was obtained from attendees.

4.4.3 Motorcyclists looking out for themselves

The RTA motorcycle safety advertising campaigns described below (and the ‘Drinking and riding don’t mix’ add above) were developed in partnership with the Motor Accident Authority (MAA) and in consultation with the Motorcycle Council of NSW. The messages formed part of the 2002-2003 public education campaign and are both factual and practical advertisements. They are practical for two reasons, one they are brief and to the point so the message is clear and driver and riders receive the message straight away. Secondly, the message itself is practical in that it provides advice on what to do on the road. The delivery of these messages is also an effective method of reaching a diverse audience, therefore capturing drivers and other road users as well as riders, and reaching a large number of road users simply through the particular placement of these messages. These advertisements were printed on the back of buses, in-venues, on outdoor advertising, on radio and mailouts were sent to motorcyclists.

Many of the messages focused on the rider looking out for themselves. Few campaigns have addressed this issue in the past. Some of the advertisements are useful in targeting both drivers and riders at the same time. The picture below specifically asks riders to look out for themselves.



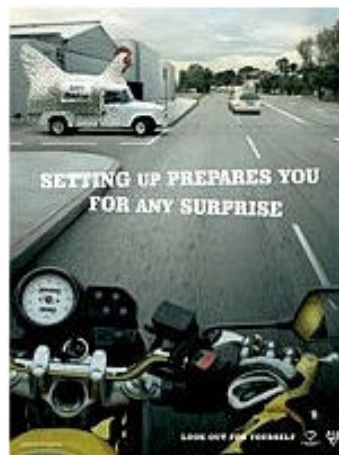
The RTA ‘Blind Spotted’ messages encourage drivers to be aware of the dangers of not checking their blind spot when changing lanes. However this add is also useful to riders, to be aware that drivers do not always see motorcycles and there are particular spots or positions on the road where vision is limited for car drivers.



The ‘Blind Spotted’ messages support the ‘Buffer’ advertisement which reminds riders to create maximum space (a ‘buffer’) between them and vehicles. The RTA supporting internet that is associated with this message reminds readers that keeping a buffer is a safe riding technique that should be learnt during motorcycle rider training.



The 'Setting up prepares you for any surprise' message reminds motorcyclists to apply brakes lightly as they approach potential hazards. The internet information again reminds readers that this is also a safe riding technique learnt during motorcycle rider training.



The 'Keep your eyes peeled for trouble message encourages motorcyclists to constantly scan the road for potential hazards. This is an important hazard perception skill and supports the techniques learnt during training.

A community education campaign, 'Survive the Ride' (*STR*) focuses on assisting riders to take responsibility for their own safety, regardless of who causes the crash. Since its inception in 2002, *STR* challenges riders to consider the gear they wear, their crash avoidance thinking skills and their riding behaviour.

The Queensland Government's television advertisement 'Keep motorbikes in sight' riders as well as drivers are targeted, asking riders to keep in sight and asking drivers to look out and use mirrors, watch at intersections, check over their shoulder and generally to keep motorcycles insight. The message highlight the point that motorcyclist face different risks. The advertisement provides facts, stating that each week one motorcyclist is killed and another 15 are hospitalised. This is a short piece which is rated G.

4.4.4 Motorcycle design, colour, and colour of protective clothing

Reflective items and other visibility products are available for purchased through motorcycle retail and accessory stores. Examples of items include reflective tape, LED lights and safety vests.

Yet, there are few activities that address conspicuity. Web information provides advice on protective clothing (see section 4.6), however, there is less information which encourage

riders to think about wearing bright and or reflective gear. An example of a program that does address this issue is run by Queensland Transport is aimed at increasing knowledge of the importance of wearing protective clothing and appropriate colours to improve visibility when riding. The safety information is posted on the Safe Communities website.

4.5 INSTABILITY AND BRAKING DIFFICULTIES

Instability and braking issues are usually addressed through a variety of activities including:

- improving vehicle design
- training;
- the promotion of safer designed motorcycles and rider education
- addressing maintenance issues.

Vehicle design improvements to braking are commonly limited to more expensive motorcycles. Small scooters and mopeds do not benefit from technological improvements in this area as do the larger and more expensive motorcycles. This is a particularly important issue as scooters and mopeds are now the largest segment of new sales for the on-road motorcycle market.

Pre-licence training attempts to cover the issues of motorcycle instability a braking difficulties. Often though, the skills required to address these issues are not covered in depth. Post licence training attempts to cover this issue. Those courses that focus on hazard perception and those which bring attention to the limitations of motorcycles in terms of stability and braking, and provide practical countermeasures are useful programs (see section 4.1.2 on training). Those courses which simply provide advanced training without addressing these components are likely to advance overconfidence in their students without providing them a balance of skills and defensive riding /hazard perception techniques. Most motorcycle education and training programs are designed for traditional motorcycles, rather than scooters and mopeds, and the specific instability and braking issues of these vehicles are generally not addressed.

There are very few programs which actively provide accurate information and promote the purchase of safer designed motorcycles. An example of an initiative that does provide accurate information is the 'Choosing safer bikes' brochure. Some rallies and rides address braking issues.

4.6 ROAD SURFACE AND ENVIRONMENTAL HAZARDS

There are several key ways of improving road surfaces and reducing hazards for motorcyclists. The first is the design and building of roads, road systems, delineation, and design of where road furniture is placed. The second is the maintenance of these components, and the third is improvements to the existing road system and the road environment. Often these improvements come in the form of devices developed by various private companies globally. Other safety improvement can be made not only through engineering activities, but also through improved motorcycle maintenance and training riders to identify road surface and other road environmental hazards.

Programs that endeavour to improve road surfaces and reduce hazards for motorcyclists are primarily run by local and state government road engineering departments. These departments are responsible for design, and oversee the building and maintenance of most road systems. Private building contractors also design, build and sometimes maintain roads in areas of residential or industrial developments, however, they must meet specifications set out by government regulation. The number of initiatives undertaken by government agencies is often limited by financial constraints. Re-engineering and re-building intersections is one way of addressing this safety issues for many situations, however, this can be very costly.

The initial design of roads and road systems can play a very important role in this safety area. Design regulations have the ability to affect all new roads, though maintenance programs generally target specific sites only. Also the re-engineering of problematic intersections sometimes occurs only when a problem has already arisen for a motorcyclist.

Other programs include road hazard reporting, which involve all road users. Generally these programs are run by local city councils or by state road agencies. Private companies have also developed improved road furniture often designed to reduce the severity of injury to motorcyclists in the event of a crash.

Occasionally programs are implemented that do not require a large engineering or re-engineering effort, rather, they are small interventions that alter the road surface or surrounds in some way. There is potential for these types of programs to be effective particularly considering their relatively low costs. However, some of these programs have not been tested before, and some can potentially have a negative effect on safety. An example of this was the use of pebbles on a road in Queensland which was frequented by motorcycle riders. The aim of the program was to slow down vehicles, however, this created a very high risk that the pebbles would scatter onto the road surface. While this may cause a minor hazard for cars and trucks, it does present a major hazard to motorcyclists and bicyclists. Any loose road surface diminishes traction for motorcyclist.

Addressing motorcycle maintenance, particularly ensuring tires have sufficient tread and are inflated with the correct pressure, is also important in addressing this issue. So too is hazard perception training which was discussed earlier in sections 4.1 and 4.4. The following section provides examples of programs which are likely to improve safety in the areas of road surface and environmental hazards.

4.6.1 The design of, and improvements to, roads and road furniture

VicRoads regularly publishes a series of 'Motorcycle Notes'. The purpose of this information is to provide regular practical advice on motorcycle-specific aspects of road design, maintenance and safety for VicRoads, local government, agency and consultant engineers and planners. The notes are designed to be read in conjunction with the Austroads publication 'Guide to Traffic Engineering Practice Part 15 – Motorcycle Safety'. An example of the series is the 'Road Markings and Slippery Surfaces' No. 4 July 2000 which provides useful information such as the 'significance of the issue', 'current guidance' and other practical information about the topic.

In 2005 and 2006, VicRoads organised motorcyclist workshops with the Victorian Motorcycle Advisory Council and Community Road Safety Council. These workshops identified key issue of concern in relation to road surfaces. Sixteen issues were identified,

some of these included: potholes; debris, gravel and loose stones; slippery road markings; metal plates and utility covers; and inadequate warning signs.

An example of where road side safety is addressed is provided by the Motorcycle Riders Association of the ACT who works with the RTA and government on this issue. They address issues including road side barriers and furniture placement, safer parking and the use of appropriate standards and changes to licensing by raising the bar in training and assessment.

Past research identified the three most prevalent methods of improving the design of safety barriers to better protect motorcyclists. These are the replacement of traditional IPE-100 posts used in most guardrail systems with the more forgiving Sigma-Posts; covering the existing posts with additional W-beams on the lower section of the guardrail system; and covering exposed posts with specifically designed impact attenuators (Koch & Schueler, 1987; Sala & Astori, 1998, cited in Duncan, Corben, Truedsson and Tingvall, 2000). Private companies around the world have developed devices that can be added to existing barrier systems to improve barrier safety specifically for motorcyclists. These include devices such as the “Plastrail”; the “Motorail”; the “Mototub”; and; a metal plate which covers exposed guardrail posts and has a high degree of flexibility enabling it to absorb energy on impact. A company in Sweden has developed a device that covers the upper and lower wire rope systems of standard WRSBs. This consists of aluminium profiles that can be fitted to existing systems. The device has been subject to computer simulations using a motorcycle, a car and a lorry with favourable indications.

The ‘Victorian Motorcycle Road Safety 2002-2007’ identified road design and maintenance as part of eight key motorcycle safety issues. The following action plans were developed to improve the road environment for riders:

Road design and maintenance

1. Review road design and management practices to ensure that the safety needs of riders are given more consideration by State and local road authorities. Reviews to be in accordance with guidelines published in the AUSTROADS ‘Guide to Traffic Engineering Practice: Motorcycle Safety (Part 15)’.
2. Develop on-road engineering programs for municipalities that target loss-of-control crashes in a rural environment.
3. Initiate further research nationally to examine road safety barrier performance in relation to motorcycles.

4.6.2 Treatments on popular motorcycle routes

In both Victoria and Queensland, the road authorities have undertaken both infrastructure and educational programs focusing on improving the safety of popular motorcycle routes. These routes are often mountain roads with curves, sight distance limitations, and vegetation and gravel or dirt on the roadway. The infrastructure treatments have largely included advisory speed signs and improved delineation. VicRoads has a motorcycle local government program ‘*Make Motorcycling Safer*’, which delivers many of these programs.

The Department of Main Roads Queensland has erected motorcycle safety awareness signs along designated routes frequented by motorcyclists. These signs are red in colour and usually have wording such as “motorcycle crash zone ahead slow down” or “speeding in

this area causes crashes” and are designed to encourage motorcyclists to slow down and increase alertness at sites that have previously demonstrated having a high frequency of motorcycle crashes.

A program designed to identify high risk intersections and roundabouts is in operation in the Queensland Far Northern Working Group Area. The program uses Webcrash2 to identify high-risk intersections and roundabouts for motorcyclists, erecting hazard signs at identified sites, and improving road infrastructure where appropriate.

4.6.3 Road hazard reporting

Many local councils have a system in place for motorists to report road hazard including maintenance issues such as pot holes and uneven surfaces. Often state government agencies will also have a system in place as well as organisations such as the RACQ.

An information reporting program has been set up by Queensland Transport in the Far Northern Working Group Area. The program’s aim is to increase road environment vigilance and hazard reporting by distributing ‘road hazard report’ forms and expanding ‘report road hazards’ roadside signs. This involves liaising with the Department of Main Roads, local councils, and Cleanaway. The program targets those people registering motorcycles, obtaining learners permits and renewing licenses, and motorcycle interest groups.

4.6.4 Auditing

The ‘Working Together for Melbourne Forum’ has set up a program to improve motorcyclists safety by auditing road surface conditions and roadside hazards throughout the municipality and improving reciprocal awareness between motorcycle riders and all other road users.

4.6.5 Blackspot programs

A blackspot is a location on the road network where crashes are concentrated. Blackspot programs involve a systematic process of identifying high-risk sites, the factors contributing to crashes at those sites and developing and implementing cost-effective solutions. Treatments of crash blackspots have been demonstrated to be highly effective in reducing road trauma for all vehicles, with benefits considerably greater than their costs. Well-designed blackspot programs can prevent at least 2 fatalities per year per \$10M invested, with a lifetime of between 15 and 25 years depending on the type of treatment (Vulcan & Corben, 1998). The extent to which motorbike riders benefit from overall blackspot programs has not been investigated to date.

In Victoria there is a Motorcycle Blackspot Program with funding of approximately \$1-2M per year from a levy on compulsory third party injury insurance premiums for motorbikes. The Program aims to improve road conditions at locations where there have been high rates of motorcycle crashes. It has three components, involving road treatments:

- at blackspots or blacklengths with high rates of motorcycle loss-of-control crashes
- at intersections with high rates of motorcycle crashes
- along popular motorcycle routes to improve the consistency of the road environment for motorcyclists.

Preliminary analysis of the first 20 treated locations showed a 58 per cent reduction in motorcycle injury crashes and an 80 per cent reduction in serious or fatal motorcycle crashes in the first 12 months. Longer-term analyses should provide better information on crash savings and provide guidance on which types of treatments are effective in reducing crashes and crash severity.

4.6.6 Intersection improvements

Many motorbike crashes occur at intersections. Improvements to intersections, particularly signalised intersections, can reduce the likelihood of drivers failing to give way to riders.

Fully-controlled right turns at signalised intersections have been shown to have safety benefits for all road users (Newstead & Corben, 2001) and these benefits may be even greater for riders because of the large problem of right-turn against crashes in which riders are injured. Clearly, the detectors at traffic signals need to be able to detect motorbikes for these benefits to occur. Trials in Victoria have shown that some inductor loops fail to detect small, light-weight motorbikes. The solutions appear to be better tuning or sensitivity of detectors and providing advice to riders on where to stop their motorbike to maximise the likelihood that it will be detected.

Advanced stop lines are increasingly being used at signalised intersections to provide a safer place for cyclists to wait. The United Kingdom Department for Transport (DFT) has commissioned research into allowing motorcycles into advanced stop lines, but the results have so far been inconclusive (DFT, 2005). Advanced stop lines in conjunction with motorbikes filtering to the front of the queue at signalised intersections are likely to have travel time savings for riders but the safety benefits or disbenefits are more difficult to measure.

4.6.7 Educating riders about dangerous road environments

In addition to programs to change road infrastructure, there have also been educational campaigns designed to reduce the involvement of particular types of road infrastructure in motorcycle crashes. The RTA has undertaken a motorcycle safety advertising campaign aimed at reducing the number and severity of motorcycle crashes on corners, particularly on key recreational routes. The images in the campaign depict several cornering scenarios, illustrating how the wrong preparation on approach could potentially lead to the rider crashing on the corner.

4.7 VULNERABILITY TO INJURY

Addressing the issue of vulnerability to injury involves reducing the injury severity during the crash and also improving treatment post crash. Vulnerability to injury is one motorcycle safety factor where programs can target all three areas, road user, vehicle and the environment, to improve this problem.

The delivery of these types of programs is often in the form of internet information, brochures, magazine advertisements and there have been a small number of and television advertisements.

4.7.1 Helmets

Given the high rate of helmet use by on-road motorcyclists, there has been little emphasis on helmets in safety programs.

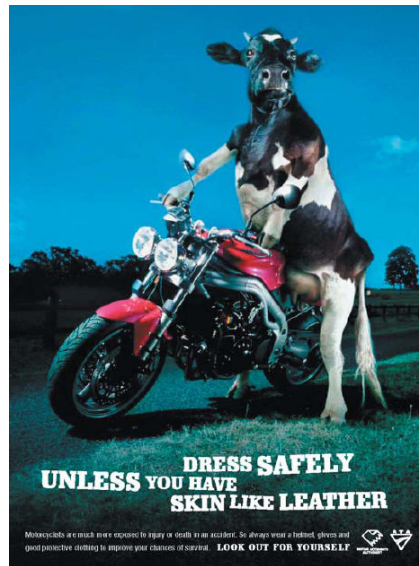
A Queensland inventor, who is a physicist with previous helmet testing and road safety experience, has designed a new shock absorbing helmet liner for motorcycle and bicycle helmets. Of the many helmets examined over 20 years, the inventor observed that of those which had been involved in a crash, their liners showed little or no evidence of damage. The inventor therefore established these helmets were not doing their job properly and this led to the design and manufacture of the 'Cone head liner'. The 'Cone head liner' is a shock absorbing liner for helmets and has a unique cone shaped, low density foam structures imbedded into the high density lining. The cones compress on impact allowing the lining to absorb the force more effectively. The liner is in the process of certification. Although no real world data is yet available and caution should be taken until this occurs, if Australian certification is successful, there is potential for this liner to prevent head injury more successfully than traditional liners.

4.7.2 Protective clothing

Wearing of protective clothing is promoted by road safety agencies. The Victorian TAC website includes a photograph of a motorcycle rider – on one half the rider's body shows protective clothing and the other half of the body show the rider with no clothing and describing the injuries a person would receive without protective clothing. There is an accompanying brochure - 'The complete skin care range for motorcyclists' – that provides detailed information brochure about costs and clothing for different types of riders <http://www.tac.vic.gov.au/jsp/content/NavigationController.do?areaID=13&tierID=1&navID=B4347615&navLink=null&pageID=206>.



The RTA had a public education campaign in 2002-03 which showed pictures of a cow riding a motorcycle with the slogan “Dress safely unless you have skin like leather”. This appeared in a range of venues, including bus backs.



The Motorcycle Riders Association of the ACT supported by the NRMA-ACT Road Safety Trust aired a television campaign on WIN TV addressing the following:

- increase riders’ awareness of their own vulnerability;
- educate riders in risk management and hazard perception skills; and
- increase drivers’ awareness of motorcycle safety issues.

4.7.2.1 Consumer advice on best protective clothing

Little information is available to Australian riders regarding the likely level of protection provided by different brands and types of protective clothing. Australian manufacturers and importers are not subject to any mandatory standards in relation to protective clothing except for helmets. For these reasons, VicRoads is funding a project to investigate the possibility of a system in Australia whereby consumers have access to information about some of the key safety characteristics of protective clothing, which they may then use in making purchasing decisions. A literature review and development of a model for a safety ‘star rating’ system for protective clothing has been completed (Haworth, de Rome, Varnsberry & Rowden, 2007). Later stages will include a market research study and a research study into the feasibility of implementing a ‘star rating’ system for protective clothing.

5. DISCUSSION AND RECOMMENDATIONS FOR SUITABLE SAFETY PROGRAMS FOR ACT MOTORCYCLISTS

This chapter discusses the programs identified in Chapter 4 and makes recommendations for suitable safety programs for ACT motorcyclists. It begins with an assessment of the limitations of the motorcycle safety programs and proposes an approach to overcome at least some of these limitations. The particular requirements of programs suitable for ACT motorcyclists are then discussed. Particular programs are then described in terms of the risk factors that they address.

The factors contributing to serious motorcycle crashes (described in section 4 and also below) can be reduced by a combination of road user, vehicle, and environment-based measures. In some cases, a particular measure may be more effective than others, but using all three measures aims to maximize the potential safety benefits that can be gained. For example, the role of road surface and environmental hazards in motorcycle crashes can be reduced in the first instance by environment (road based) safety initiatives such as blackspot programs and improving road surfaces, but it can also be reduced through training (a rider based initiative) and improved maintenance of the motorcycle (a vehicle based initiative).

5.1 LIMITATIONS OF EXISTING PROGRAMS

In collecting and examining motorcycle safety programs from across Australia and New Zealand, a range of limitations of existing programs were identified. While there was some overlap, the limitations of local programs and statewide programs were somewhat different.

The limitations identified for local programs were as follows:

- often programs are not coordinated in such a way that the safety message effectively reaches the target group.
- some local programs do not have all the resources required to implement their program or reach a large number of people. There is potential for larger organisations (such as government agencies) and small local community groups to work more collaboratively, as it appears this is not currently occurring widely
- the information provided is not always accurate
- programs may appear to be effective, but may simply be moving the problem elsewhere and when the program has been completed, the problem returns. Enforcement programs may move riders elsewhere, giving a temporary improvement only.

With regard to statewide programs:

- government agencies do not always consult with motorcyclists and this may result in a lack of acceptance of materials and programs that are developed

- the initiative may not suit the local area e.g. resurfacing the road with stones that may become slippery
- delivery of material, or the message, is undertaken by a method that appears to be cheapest but may not reach the target audience. For example, sending brochures to registered owners of motorcycles when it is new licence holders that are the target.

In terms of identifying effective programs, the most serious limitation was the lack of evaluation of program effectiveness. While this was unsurprising and understandable for local programs, many large statewide programs had only limited (or no) process evaluation available and very few had an outcome evaluation.

With regard to the criteria for assessing the suitability of programs that were described in Section 2.2.1, very few programs can be said to be “proven beneficial”, although there are quite a few that are “likely beneficial”.

5.2 POTENTIAL APPROACH TO LIMITATIONS

For these reasons it is recommended that structured guidance material or guidance packages are developed and made available for use by all groups or organisations developing motorcycle safety initiatives. The key components of these packages should be as follows:

- The packages would provide accurate motorcycle safety facts. This would ensure the developers or designers of programs can be confident that the information they are providing is accurate. This would also ensure riders can feel confident that the information they are provided has been assessed by researchers, government and industry groups and has been agreed upon as being both accurate as well as practical information. The packages would provide a structure by which these program developers (researchers, government, rider groups and associations, motorcycle industry, insurers and individuals) could work ‘on the same page’.
- The main road safety authorities in the ACT should be the organisations that distribute the packages as official government guidance material. It should be made clear in the information that the material is based on research evidence and all relevant groups have been consulted. It is important that program designers and riders trust the information provided and the packages are seen as useful, and become a standard for the development of motorcycle safety programs.
- The packages should include information which would guide designers in their thinking about the possible wider effects of the program, the possible negative and positive implications of implementation at the design stage and the wider effects once the program is in operation. Often program might appear to be reducing crashes in their local area, however, it may have simply reduced motorcycle exposure in that particular areas and moved the problem else where. In effect, the packages should provide guidance on how to evaluate their program for its effectiveness.
- The packages should provide advice on the best ways to go about delivering the information and best ways of running the program. This would provide guidance to

help improve the effectiveness and efficiency in attempting to address the program aims and getting the message across to the target group.

- The packages should encourage collaboration and consultation with other groups and government organisations in order that
 - organisations know what others are doing,
 - programs do not compete with each other,
 - the overarching road safety government bodies can better identify areas in need, areas which already have programs in place and can allocate safety resources more efficiently and effectively.
- Packages should provide material in a way such that groups can choose what might best work for them in terms of the specific motorcycle issues to their area and the practicalities of implementing a successful program in that area.
- As the following factors have been identified as contributing to the over-representation of motorcycles in serious crashes (Haworth et al, 2007), the guidance packages should address each of these areas:
 - Vulnerability to injury
 - Inexperience or lack of recent experience
 - Driver failure to see motorcycles
 - Instability and braking difficulties
 - Road surface and environmental hazards
 - Risk taking.

5.3 SPECIAL ISSUES FOR POTENTIAL ACT PROGRAMS

The special issues in selecting programs that will be potentially of benefit to ACT motorcyclists were considered to be ACT motorcyclists riding in NSW and difficulties associated with a small population.

5.3.1 Riding in NSW

The evidence suggests that not only do ACT motorcyclists do a significant amount of riding in NSW, but that riding in NSW is associated with a higher fatality and injury crash risk than riding in the ACT (Imberger, Styles & Cairney, 2005; Pyta, 2007). Thus, at least some of the delivery of road-based safety programs to ACT motorcyclists may need to occur within NSW, possibly as collaborative projects with NSW road safety agencies and neighbouring municipalities. It is noted that the ACT-NRMA Road Safety Trust has partnered with the RTA, local government and police on speed and fatigue awareness campaigns on nearby regional highways. It may be valuable to extend this approach to motorcycle safety programs.

5.3.2 Difficulties associated with small population

It will be hard to evaluate the success of any program in reducing crash occurrence or crash severity since the ACT crash numbers are small. This issue can be partly addressed by

restricting programs to those that have been shown to be beneficial elsewhere and by conducting an adequate process evaluation.

Delivering programs in collaboration with road safety stakeholders in surrounding areas of NSW may also have benefits in increasing the reach of programs, and thus potentially facilitating evaluation.

While the ACT has a relatively small population, it must be recognised that ACT riders are influenced by external organisations. Many motorcycle clubs are part of national organisations and there is an extensive network of motorcycle websites. For some programs, the best delivery mechanism may be to influence motorcycle clubs at the national level or to provide links to websites of interstate organisations.

5.4 RECOMMENDED PROGRAMS TO REDUCE VULNERABILITY TO INJURY

The aim of protective clothing is to reduce the vulnerability of motorcyclists to injury, particularly in crashes at lower speeds. A large number of studies since 1976 have confirmed that protective clothing can reduce the frequency and extent of abrasions and lacerations of the skin and soft tissue in motorcycle crashes (reviewed in de Rome & Stanford, 2003). These findings have led road safety agencies to encourage riders to wear full protective clothing (gloves, boots, and jacket and pants, or suit). While the research shows that protective clothing reduces injury, there is little research on the effectiveness of programs to increase the use of protective clothing. Nevertheless, programs to reduce vulnerability of injury should focus on use of protective clothing.

5.4.1 Programs for road safety stakeholders

- Linking to, or adaptation of protective clothing promotional campaigns undertaken by RTA and TAC
- Promotion of the need for development and provision of information on what constitutes effective protective clothing
- Promotion of the need for protective clothing to scooter riders

5.4.2 Programs for motorcycle clubs and other local organisations

- ‘What to do post crash’ courses, including securing the scene and motorcycle specific first aid courses.
- Encourage the appointment of a first aid officer (as well as ride leader and end person) on group rides.
- The promotion of protective clothing or establishment of protective clothing requirements for club rides.

5.5 RECOMMENDED PROGRAMS TO COUNTERACT INEXPERIENCE OR LACK OF RECENT EXPERIENCE

Licensing and training initiatives are the most common approaches to counteracting inexperience or lack of recent experience. Unfortunately, the research suggests that the licensing and training initiatives that are most likely to result in motorcycle crash reductions appear to be those that function to reduce the number of riders or the amount of riding, rather than those that reduce the risk per distance ridden.

5.5.1 Programs for road safety stakeholders

Based on what ACT already has in place, it is recommended that future improvements made to the licensing system focus on the following components:

- Not allow exemptions from novice rider licensing requirements for older riders either because they are older or because they already hold a car licence.
- Zero BAC for L and P
- Display L and P plates
- Following supervisor for Ls
- Increased roadcraft training at both L and P (may require longer training duration and better educational skills of trainers)
- Off-road testing to obtain L, on-road testing for P
- Hazard perception testing
- Compulsory training to obtain L and P

For returning riders, refresher courses that address basic skills and hazard perception, rather than advanced or racing skills, are likely beneficial.

Given the increasing popularity of scooters, not only do education programs need to further incorporate safe scooter riding in their content, but the degree to which the current motorcycle training and licensing systems address scooter riding needs to be reconsidered.

5.5.2 Programs for motorcycle clubs and other local organisations

- Promoting refresher courses for returning riders that address basic skills and hazard perception, rather than advanced or racing skills

5.6 RECOMMENDED PROGRAMS TO COUNTERACT DRIVER FAILURE TO SEE MOTORCYCLES

The following are programs that have been assessed as being most effective in addressing the issue of drivers' failure to see motorcyclists and it is recommended that the following type of programs be addressed in guidance packages.

- ‘Look out for motorcyclist’ programs. It is also important that motorcyclist look out for themselves as well. A large emphasis should be placed on hazard perception skills and encouraging motorcycles to position themselves on the road where other users can see them rather than in a position where drivers do not expect motorcyclists to be. This information should be delivered in conjunction with programs targeting public awareness of motorcycle. Both conspicuity (e.g. wearing bright and reflective clothing in order to be seen) and motorcyclist perception of hazards (e.g. not riding in the line, or shadow of a sign) are important issues to be addressed.

5.7 RECOMMENDED PROGRAMS TO REDUCE INSTABILITY AND BRAKING DIFFICULTIES

The following are programs that have been assessed as being most effective in addressing the issues of instability and braking difficulties and it is recommended that the following type of programs be addressed in guidance packages.

- Hazard perception and emergency braking programs. These should be included in motorcycle training.
- Programs promoting purchase of motorcycles with better braking technology (such as ABS or linked braking systems).
- Programs promoting better motorcycle maintenance.

5.8 RECOMMENDED PROGRAMS TO REDUCE ROAD SURFACE AND ENVIRONMENTAL HAZARDS

5.8.1 Programs for road safety stakeholders

- Educate road managers on motorcycle-friendly road design and maintenance practices
- Identify and treat motorcycle blackspots
- Establish and promote a road hazard reporting line
- Undertake motorcycle-oriented road safety audits

5.8.2 Programs for motorcycle clubs and other local organisations

- Encourage reporting hazardous locations and treatments to the relevant authority

5.9 RECOMMENDED PROGRAMS TO REDUCE RISK TAKING

5.9.1 Programs for road safety stakeholders

- Linking to, or adaptation of drink riding campaigns undertaken by RTA and TAC
- Enforcement activities to detect unlicensed and unregistered vehicles

- Randomly scheduled, sustainable enforcement on popular motorcycle routes

5.9.2 Programs for motorcycle clubs and other local organisations

- Setting alcohol guidelines for club rides
- Incorporating measures to minimise fatigue on club rides
- Drink riding promotional material in hotels and other venues frequented by riders.

REFERENCES

- ABS (2005). *Survey of motor vehicle use. ABS catalogue 9210.0.55.001*. Canberra: Australian Bureau of Statistics.
- ABS (2006). *Motor Vehicle Census, Australia, 31 March 2006*. ABS catalogue 9309.0. Canberra: Australian Bureau of Statistics.
- ABS (2007) *Survey of motor vehicle use*. ABS catalogue no. 9208.0. Canberra: Australian Bureau of Statistics.
- ATSB (2002). *Motorcycle Safety. Monograph 12*. Canberra: Australian Transport Safety Bureau.
- ATSB (2006). *Road deaths Australia: Monthly bulletin December 2005* Canberra: Australian Transport Safety Bureau.
- ATSB (2007) *Road Deaths Australia 2006 Statistical Summary*. Canberra, Australian Capital Territory.
- Berry, J. & Harrison, J. (2007) *Serious injury due to land transport accidents, Australia, 2003-04*. Catalogue. no. INJCAT 107. Canberra: Australian Institute of Health and Welfare.
- Chesham, D.J., Rutter, D.R., & Quine, L. (1993). Motorcycling safety research: A review of the social and behavioural literature. *Social Science Medicine*, 37, 419-429.
- Christie, R. and Harrison, W. (2001). *Investigation of motorcycle crash patterns for riders aged 17-25 in NSW and development of countermeasure strategies*. Report to the Motor Accidents Authority of NSW.
- de Rome, L. and Stanford, G. (2003). Motorcycle protective clothing. Paper presented at the 2003 Road Safety Research, Policing and Education Conference.
- de Rome, L., Stanford, G. and Wood, B. (2002). *MCC Survey of Motorcyclists, 2001*. Colyton, NSW: Motorcycle Council of NSW, Inc.
- Diamantopoulou, K., Brumen, I., Dyte, D. and Cameron, M. (1995). *Analysis of trends in motorcycle crashes in Victoria (Report No. 84)*. Melbourne: Monash University Accident Research Centre.
- Duncan, C., Corben, B., Truedsson, N. and Tingvall, C. (2000). Motorcycle and safety barrier crash-testing: Feasibility study. Report prepared for the Australian Transport Safety Bureau. Melbourne: Monash University Accident Research Centre.
- Elliott, M., Baughan, C., Broughton, J., Chinn, B., Grayson, G., Knowles, J., Smith, L. & Simpson, H. (2003). *Motorcycle safety: a scoping study*. TRL Report TRL 581. Crowthorne: Transport Research Laboratory.
- FORS (1997). *Risk taking by intoxicated drivers & riders*. Monograph 15. Federal Office of Road Safety. Available at:
http://www.atsb.gov.au/publications/1997/pdf/Alc_Risk.pdf

- FORS (1999). Monograph 27. *Road risk for sober, licensed motorcyclists*. Canberra: Federal Office of Road Safety.
- Haworth, N. (2003). How valid are motorcycle safety data? Paper presented at *Road Safety Research, Education and Policing Conference*, September 24-26, Sydney.
- Haworth, N., de Rome, L., Varnsvery, P. and Rowden, P. (2007) Motorcycle protective clothing: Are stars better than standards? Presented at 2007 Australasian Road Safety Research, Education and Policing Conference, Melbourne, 16-18 October 2007.
- Haworth, N., Greig, K. & Wishart, D. (2007). *Motorcycle and scooter training and licensing*. Unpublished report to VicRoads. Brisbane: Centre for Accident Research and Road Safety- Queensland.
- Haworth, N. & Mulvihill, C. (2005). *Review of motorcycle licensing and training* (Report No. 240). Melbourne: Monash University Accident Research Centre.
- Haworth, N., Mulvihill, C., and Clark, B. (2007) *Motorbike safety in Queensland – Technical paper*. Unpublished report. Melbourne: Monash University Accident Research Centre.
- Haworth, N. & Nielson, A. (2007). Motor scooters and mopeds: A growing attraction for young people. Paper presented at the *Australasian College of Road Safety Conference on Infants, Children and Young People and Road Safety*, Sydney, 2-3 August 2007.
- Haworth, N. & Rowden, P. (2006). *Investigation of fatigue related motorcycle crashes- Literature review*. Report to VicRoads. Brisbane: Centre for Accident Research and Road Safety – Queensland. Available at: <http://eprints.qut.edu.au/archive/00006250/01/6250.pdf>
- Haworth, N., Smith, R., & Kowadlo, N. (1999). *Motorcycle training in Victoria: Evaluation of rider training curriculum in Victoria*. Report prepared by the Monash University Accident Research Centre for VicRoads.
- Imberger K, Styles T & Cairney P. (2005). *Crashes involving ACT vehicles and ACT controllers in NSW 1999 – 2003*. NRMA-ACT Road Safety Trust.
- Pyta, V. (2007). Crash rates of ACT vehicles inside and outside the ACT (RC72615). Melbourne: ARRB Group.
- Queensland Transport (2005). *Road Traffic Crashes in Queensland. A report on the road toll*. Land Transport and Safety Division, Brisbane.
- Reeder, A.I., Chalmers, D.J., & Langley, J.D. (1996). Rider training, reasons for riding, and the social context of riding among young on-road motorcyclists in New Zealand. *Australian & New Zealand Journal of Public Health*, 20, 369-374.
- RTA (2004). Motorcycle Safety. Issues and countermeasures. Publication no. 04.092. NSW: Roads and Traffic Authority.

- RTA (2007). Monthly Bulletin of Preliminary Traffic Crash Data for August 2007. NSW: Roads and Traffic Authority.
- Simpson, H.M. & Mayhew, D.R. (1990). The promotion of motorcycle safety: training, education and awareness. *Health Education Research: Theory and Practice*, 5, 257-264.
- TAC (2007a). Other mass media communications- Alcohol and riding. Available at: <http://www.tac.vic.gov.au/jsp/content/NavigationController.do?areaID=13&tierID=3&navID=46DE210F7F00000100A0BA6C759366FD&navLink=null&pageID=1205>
- TAC (2007b). Outline of the TAC's motorcycle safety program. Available at: <http://www.tac.vic.gov.au/jsp/content/NavigationController.do?areaID=13&tierID=3&navID=42F8F03B7F00000100A0BA6C1410A9E7&navLink=null&pageID=1203>
- TOI. (2003). *Motorcycle safety – a literature review and meta-analysis of countermeasures to prevent accidents and reduce injury*. (English summary). Oslo: Institute of Transport Economics.
- Vulcan, P. and Corben, B. (1998). *Prediction of Australian Road Fatalities for the year 2010*. Paper prepared for the Federal Office of Road Safety. Melbourne: Research and Safety Services.
- Watson, B. and Steinhardt (2007). The long-term crash involvement of unlicensed drivers and riders in Queensland, Australia. Paper presented at the *T2007 International Conference on Alcohol Drugs and Traffic Safety (ICADTS)*, Seattle USA, 26-30 August 2007.

APPENDIX 1: MOTORCYCLE SAFETY PROGRAMS EXAMINED

Motorcycle programs: topic and mode of delivery		
Program name	Program topic	Medium/Type of program
Helmet trade-in project North Sydney Council	vulnerability to injury	Trad-in system
'Survive the Ride' - Sydney south western suburbs	vulnerability to injury	brochure, give-aways
'Dress safely unless you have skin like leather'	vulnerability to injury	magazine ad
'The complete skin care range for motorcyclists'	vulnerability to injury	web - booklet
'Before other help arrives'	vulnerability to injury	web - booklet
Motorcycle clothing & colours	vulnerability to injury	web
Safer parking	road surface and environment	Road surface and env - engineering
Roadside safety	road surface and environment	Road surface and env - engineering
Signage on designated motorcycle routes (main roads)	road surface	signs
Workshops VicRoads VMAC Community Road Safety Council	road surface	Workshops
Melbourne Forum-Focus community	road surface	auditing
Blackspot program- Vic	road surface	black spot program
Far Northern-Identifying high risk intersections & roundabouts	road surface	research
Far Northern- Road hazard reporting	road surface	distributing 'road hazard report' forms and expanding 'report road hazards' roadside signs
Queensland Police Service-targeted routes	risk taking	enforcement
'Drink, ride, bloody idiot'	risk taking	mixture - printed materials located where riders frequently take rest breaks and comfort stops (e.g.

Motorcycle programs: topic and mode of delivery		
Program name	Program topic	Medium/Type of program
		cafes, pubs, toilets) & activities at the Australian Motorcycle Grand Prix held on Phillip Island
Far Northern-Increase licensing enforcement	risk taking	enforcement
Far Northern- Address drink driving	risk taking	mixture - billboards and radio
Victorian Motorcycle Road Safety Strategy 2002 - 2007	mixture	Strategy 2002 - 2007
Slipstream motorcycle TV series	mixture	tv
Ulysses Motorcycle Club activities	mixture	mixture
'Think before you hit the road'	mixture	web education; brochure
'Breakfast Torque'	mixture	Talk - Breakfast talk
Special interest nights	mixture	special interest night
'High-Vis' ride	mixture	mixture -ride and demonstration
AMC federal election survey publication	mixture	web publication
'Arrive alive - the Great Ocean Road'	mixture	ride guide -dvd
Levy -Special projects for motorcycle safety	mixture	mixture
Motorcycle videos	mixture	video library
"Safety team" - Australia Post	mixture	
Touring the Illawarra	mixture	brochure
Riding the Hunter	mixture	ride guide
Snowy mountains-guide to safe riding in groups	mixture	ride guide
Capital hill rally	mixture	rally
Awareness week	mixture	mixture - rides, displays,

Motorcycle programs: topic and mode of delivery		
Program name	Program topic	Medium/Type of program
		breakfasts & dinners
The ride attitude TV commercial	mixture	tv ad
'RIDE for EVER'	mixture	web education
ROADSAFE NZ Post program	mixture	mixture including dvd
ACC Community-based motorcycle safety projects	mixture	mixture
NZ Road Safety to 2010 strategy	mixture	strategy 2010
NZ Land Transport NZ Safety info web	mixture	web education
SA Strategy 2005-210 Motorcycling Road Safety Strategy	mixture	strategy
NSW Road Safety Strategic Plan 2002-2005 "Positioned for safety"	mixture	strategy
NSW Safety Action plan 2002-2004 Motorcyclist and Bicyclist	mixture	action plan
Safety tips - NT	mixture	web
Motorcycle safety strategy-TAS	mixture	strategy
Albury City "Motorbikes Are Out There – Take Care!"	mixture	awareness week
TAC "Motorcycle Safety' web information	mixture	web
Doin' It Legal – Talk to the Blue	mixture	exhibition - day - annual
Rider Survivor	mixture	days
Public Education Kit	mixture	
Motorcycle safety awareness sessions	mixture	mixture - sessions & compliance activities
Motorcycle Awareness Week (Cairns and Townsville)	mixture	mixture -displays, media, advertising, distribution of hazard hotline cards and education materials.

Motorcycle programs: topic and mode of delivery		
Program name	Program topic	Medium/Type of program
Motorcycle Safety Taskforce (Cairns)	mixture	taskforce
Motorcycle Safety Taskforce (Townsville)	mixture	taskforce
QLD- Post licence training courses	inexperience or lack of recent experience	training - post licence
NZMSC	inexperience or lack of recent experience	ride - refresher
Raising the bar in training and assessment	inexperience or lack of recent experience	raising the bar in training and assessment to improve licensing
Learner and slow riding practice	inexperience or lack of recent experience	training-practice
Victorian rider Handbook	inexperience or lack of recent experience	Handbook
'The right line' - Tips for better riding	inexperience or lack of recent experience	educational publication
'Chasing the Dream'	inexperience or lack of recent experience	education publication
'Discover Safe Riding'	inexperience or lack of recent experience	education publication
RTA-Public education - overall initiative	inexperience or lack of recent experience	slogan - mixture campaign consisted of print, radio and ambient advertising
On-road hazard perception training program	inexperience or lack of recent experience	training course
'MASTERS' courses	inexperience or lack of recent experience	training course
'Ride 'n Thrive' ON ROAD RISK MANAGEMENT COURSE	inexperience or lack of recent experience	training course
'Four-day learner and licence course'	inexperience or lack of recent experience	training
ROADSAFE mentor program	inexperience or lack of recent experience	mentor program
'Ride smart'	inexperience or lack of recent experience	training

Motorcycle programs: topic and mode of delivery		
Program name	Program topic	Medium/Type of program
NZMSC Book- 'The secret skills of motorcycle riding- Level 1 and 2'	inexperience or lack of recent experience	book
NZMSC training/MegaRider.com	inexperience or lack of recent experience	training
Defence motorcycle awareness campaign	inexperience or lack of recent experience	training
'Ride on'	inexperience or lack of recent experience	dvd
Q-RIDE	inexperience or lack of recent experience	training
Trialled reintroduction of L-plates	inexperience or lack of recent experience	licensing
Graduated rider licensing	inexperience or lack of recent experience	licensing
Far Northern -education package	inexperience or lack of recent experience	education package - mixture - CD, brochure and media announcements
New knowledge test- Victoria	inexperience or lack of recent experience	licensing - test
'Buffer'	driver failure to see motorcyclists	mixture - slogan - print, bus backs, radio, convenience, in-venue, outdoor advertising and mailouts
'Setting up prepares you for any surprise'	driver failure to see motorcyclists	mixture - slogan - print, bus backs, radio, convenience, in-venue, outdoor advertising and mailouts
'Keep motorbikes in sight'	driver failure to see motorcyclists	Mixture, billboards; radio
'Keep motorbikes in sight' - rated G	driver failure to see motorcyclists	tv ad
Community intersections project ACC NZ	driver failure to see motorcyclists	mixture-promotion
Be aware of motorcyclist-MRA	driver failure to see motorcyclists	inside of registration lables
'Look twice for motorcycles- what do	driver failure to see	mixture

Motorcycle programs: topic and mode of delivery		
Program name	Program topic	Medium/Type of program
we have to do to get notices'	motorcyclists	
'Distracted drivers are dangerous'	driver failure to see motorcyclists	tv add
'Put yourself in their shoes	driver failure to see motorcyclists	tv add and mixture
'Don't ride us off'	driver failure to see motorcyclists	tv add
Mirror-'Somewhere in this picture is a motorcycle rider'	driver failure to see motorcyclists	newspaper
'Blind spotted'	driver failure to see motorcyclists	mixture - slogan - print, bus backs, radio, convenience, in-venue, outdoor advertising and mail outs
'Car drivers - look out for motorcyclists'	driver failure to see motorcyclists	mixture - slogan - print, bus backs, radio, convenience, in-venue, outdoor advertising and mail outs
'Drinking and riding don't mix'	driver failure to see motorcyclists	mixture - slogan - print, bus backs, radio, convenience, in-venue, outdoor advertising and mail outs
'Keep your eyes peeled for trouble'	driver failure to see motorcyclists	mixture - slogan - print, bus backs, radio, convenience, in-venue, outdoor advertising and mail outs